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The system builders' computer.

## Argus700 Series 2.

FERRANTI  
Computer Systems

### NEWS IN BRIEF

#### WP combined with pictures

A NEW text storage system combining image storage with word processing is being developed by Correlative Systems in Birmingham in conjunction with News. This uses the screen of the newly-launched Nexos 2200 word processor to display scanned images of documents and ordinary WP text at the same time.

Corrasy, as the UK company is known, already makes image storage systems that use CCD scanners for input and disc or magnetic tape to hold images, which are used mainly in specialist applications such as banking and engineering. General manager George Nunn thinks the new system could form the nucleus of an electronic office, particularly for special task groups in research organisations, civil engineering, or manufacturing where drawings are much used. It would probably have from three to 10 terminals.

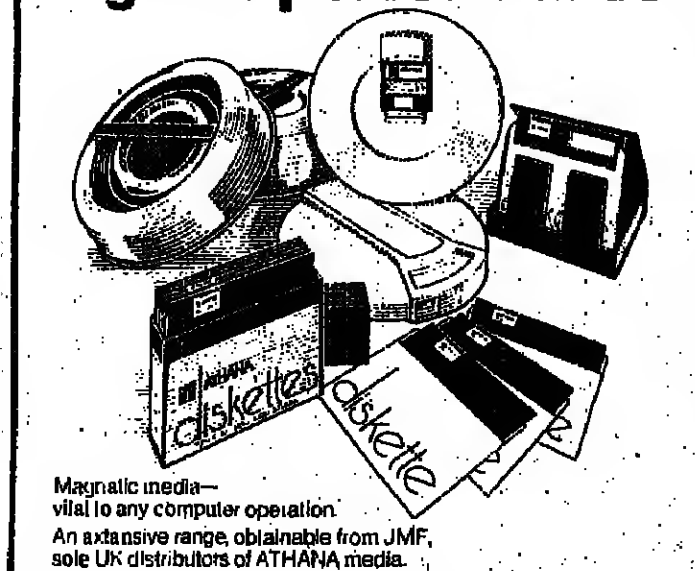
#### EMI Datel deal

EMI SE Labs has won a contract worth over £1.2 million to provide in quantity two types of wireboard module designed by British Telecom for its Datel 48K leased line data communications service. Type 35 is for installation in customer premises at each end of the link and Type 36 is for British Telecom's repeater stations.

#### Software addition

A NEW software option has been added to Ferranti's "alternative to the ICL 7502 and IBM 3270," the P17 Programmable Terminal System. The addition is a File Handling Terminal Package, FTP which builds on its predecessor, ITP Interactive Terminal Package, to give local disc handling with indexed sequential, random and serial files. It is aimed at such areas as order entry offices and stores.

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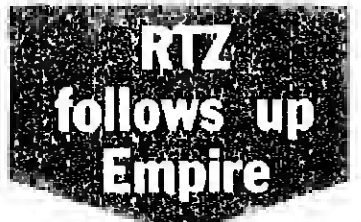
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# Viewdata is Plessey opener

PLESSEY'S moves into the end-user market for office products are finally beginning to take shape, with the development of a combined telephone and compact viewdata receiver, and the announcement that the telecommunications company's long-awaited plans for what it calls the Integrated Office System will be revealed by the end of the year.

## ICL small system gets Winchester

IN a bid to link itself with the latest in small systems technology, ICL has signed a deal with Micropolis of Chatsworth, California. From the beginning of next year Micropolis will be shipping its 1200 Series of 8-inch Winchester disc drives for incorporation within ICL's ME29 computer. Launched in March of this year, the ME29 spearheads ICL's effort to capture a portion of the small systems market. It has four basic storage options of which the Model 10 Winchester option is the smallest. The other models, both fixed and exchangeable discs, are supplied in ICL by Control Data.



#### Marriage

The marriage of Winchester technology with the ME29 did not coincide with the ME29 launch because, in the words of an ICL spokesman, "We hadn't fully analysed the Winchester market at the time."

For all the brouhaha generated by Winchester such as the 1200 Series, Micropolis is still in the early stages of production, having manufactured 1,000 units to date. By the end of next year Micropolis expects to have cranked up to volume production quantities of 100 drives per day, and the ICL order should account for 10% of these.

Both companies were involved in the interface work which involved changes in hardware and firmware. ICL has not specified how many of the drives it will be taking but the contract covers a three-year period.

The 35-megabyte capacity of the 1200 Series will provide an ideal

#### Pilot installations

Plessey's entry in the Office of the Future stakes are to start in early 1981.

The viewdata set, known as Viewtel, is now complete in its design and Plessey is considering how to market it. Discussions are also being held with British Telecom about how it meets the requirements for Prestel.

A small screen, a handset, and a push-button dialling unit are all combined in one desk-top housing; the buttons are used both for dialling and communicating with the viewdata computer.

Later an alphabetic keyboard and a small printer will be added, and slow-scan television is also being considered as a possible feature. Repetitive dialling is already included.

A mobile terminal intended for use in vehicles, using radio communications, has also been developed. Called the Universal Mobile Communications Terminal, it has a small screen, an alpha keyboard, and special encryption



Pitcher

facilities to make the communications highly secure.

It is intended for use by security patrols in communicating with their bases and obtaining information from databanks. The Swedish police have already placed an order.

Managing director Des Pitcher said that Plessey might well expand this work into providing complete hardware and software systems for the police.

The outcome of Plessey's two-year development work at Beeston, Notts, on an integrated office system is still not clear, but Pitcher affirms it will be based on the PDX digital private telephone exchange, calling it an office computer, not just an office telecomm switch. It will have to include text editing and processing software, which is a new venture for Plessey.

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## Cash flow problems slow SRC aid

SUCH areas as telecommunications and microelectronics have benefited quite considerably from Science Research Council grants last year, but cash flow problems led to inevitable cut-backs in a number of sectors, according to council chairman, Professor Sir Geoffrey Allen.

The council's interactive computer facility at Rutherford had, for instance, developed more quickly than anticipated and could therefore take cuts and still maintain planned progress, he said, presenting the council's report for 1979-80.

"The cash flow problems are partly of our own making and partly a result of the recession we find ourselves in. We're tightly stretched across all our areas of activity, but we're confident that we'll be right back on course over the next year or two."

About 23% of the council's budget had gone on the engineering sector with microelectronics getting between 35% and 40% of that amount. Asked why engineering hadn't got a bigger slice of the budget, he replied:

"Industry must put itself back on its feet by means of its own efforts. What we can do is provide a launching pad for people and ideas for them to choose from."

The council's gross expenditure for 1979-80 was £181,074,702.

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## IBM CUTS MANUFACTURING COSTS WITH TIGHTER PACKAGING AS ICL BOOSTS ITS MIDDLE RANGE

# 'No wires' production key to H-series profits

CHEAPER production from radical new packaging is the one major innovation of the 3801, first member of the long-awaited H series from IBM. Announced on November 12, the date most favoured by IBM watchers (CW, October 26), the 3801 offers a performance well in excess of 10 million instructions per second using two tightly coupled processors.

IBM aims to maintain profits by slashing production costs through eliminating much of the wiring. It quotes £1.9 million for a 16 megabyte 3801 with 16 channels. But

the price/performance improvement over the 303X machines is not as dramatic as that offered by the 4300 series over medium scale 370s.

Nevertheless, IBM has seen fit to reduce purchase prices on all 303X computers by around 20%, an indication that the smaller H series six mhp H series mode will follow.

Andahl is reacting to the 3081 announcement by immediately unveiling the new top end machine held under wraps in anticipation of the H series launch. Vendors of

the IBM compatible versions of the Hitachi M-200H, which IBM can now match in power albeit with two tightly coupled processors, may have to revise their pricing. But 3081 deliveries will not start until the fourth quarter of next year.

IBM has also announced the 3033 Model Group S, an entry level machine for the 3033 Series that offers field upgradability to the 3033 multi-processors. At £625,000 for a four megabyte system, the 3033 Group S costs only 50% more than a 3031 while

offering twice the power, a further indication of IBM's anxiety to sell off its stock of 3033 processors. Apart from the dynamic design of the 3081 CPU, with two processors sharing the same main memory and operating system, the main new technology feature is the packaging of more than 100 devices with a total of 45,000 circuits on a 33-layer ceramic substrate.

The chip carrying area of the substrate measures only nine centimetres square and replaces a great

● Turn to page 13

# High power upgrade for 2956

UP to three times the power and twice the price/performance of the existing ICL 2956 is offered by the 2966, one of two new 2900 series mainframes formally launched by ICL as part of a major package of hardware and software announcements. As expected the other new machine is the 2955. Its features will include support for TME, the ME29 transaction processing system.

Another product expected for some time and now officially unveiled is Concurrent Machine En-

vironment, the microcoded facility for running either of the VME operating systems concurrently on the same machine with DME. It employs the technique known as time slicing (CW, April 17) and will be available on the 2946, 50, 55, 56 and 66 but not the 2960.

Along with CME, ICL is offering a facility called Adram 1900 which enables VME programs to read and write data from 1900 DME files.

The package of announcements also includes some of the extra promised facilities for Information Processing Architecture (CW, July 31), an entry level version of the VME/B operating system called VME/B-E, and a new version of VME/K, KSV 18, which offers support for CME and the new IPA facilities.

The 2955 is based on the 2946, the machine quietly introduced by ICL earlier this year. A 2946 can be field upgraded to a 2955 with the addition of some extra

microcode. A version of CME called CME/2 will enable DME/2 or 2904 users to start developing new applications under VME/K. ICL points out that the support for TME on the 2955 will enable users to build networks of ME29s linked to a 2955 with the help of IPA.

ICL says that the 2955 offers about 20% more power than the existing 2950/20 and quotes a price of £340,000 for a system with one Order Code Processor, one Device

● Turn to page 13

# Copyright furore that never was

ANOTHER promising test of software copyright law has fizzled out before even reaching the courts.

Chris Gary of Compshop in Barnet has given a voluntary undertaking not to market or distribute a version of the firmware debugging and editing Toolkit for the Commodore Pet.

Gary, who has been in hot water before over price-cutting (CW, August 28) and marketing an unauthorised cheaper version of Clive Sinclair's ZX80 (CW, June 12), received a letter from the solicitors of Zynar, the Toolkit's distributors, on Friday. He replied with a telex which agreed to abide by Zynar's requirements, adding: "In no way does this constitute an admission of guilt."

Zynar was poised to serve Compshop with an injunction on Monday when Gary's hasty compliance made it unnecessary.

#### Close eye

The Toolkit copy had come to their attention through the Pet newsletter Printout, and for some weeks Zynar kept a close eye on Compshop.

Zynar obtained a copy of Compshop's Toolkit to establish whether or not it was pirated. A careful case against Compshop was then pieced together, culminating in the solicitors' letter on Friday. The Toolkit is a firmware ROM

#### Amicable

ACT Microsoft ceded the Toolkit agency to Zynar in an amicable agreement earlier this year, after Zynar's parent, multinational Rank, decided to move in on the micro market by financing Nestor Systems' Apple ClusterBus.

In an agreement by which Zynar undertook the exclusive marketing of Nestor products in West Europe (CW, August 2) Uzbridge-based Zynar acquired the Toolkit, which had been a Petsoft top-seller.

Zynar's Colin Crook explained that he was trying to protect the company's investment in new developments as much as the existing Toolkit, which being implemented on ROM has always been vulnerable to piracy, and now has competition from other candidates for the spare Pet socket.

"I'm not going to tolerate copies of our products in Europe, and so we built up a case-law against unauthorised 'trading'," he told Computer Weekly.

He added: "I'm damned if I'll

● Turn to page 6

## BRIEFING... BRIEFING... BRIEFING

### UK invests £327m in micros

THE UK has committed the most of all EEC countries to the support of microelectronics by investing £327 million for manufacturing facilities, applications and education, according to an International Labour Organisation study. In total EEC members have committed £900 million.

### New Minister

THE French government has appointed a new Minister for Telecommunications. He is Pierre Ribes, 61, a political science graduate and member of the French parliament since 1968.

### Personal push

JAPANSE exports of personal computers into EEC countries have risen from almost zero last

year to over 1,000 units a month for the first nine months of this year. Already one company, Sord Computer Systems, has received a warning from France to restrain its exports, or restrictions could be imposed.

### Control of Rand

SIA Computer Services, the UK subsidiary of the French CISI Group, has bought a 75% shareholding in Rand Information Systems. A software and system conversion group, Rand has 30 staff.

### \$100 for Italians

THE IBM 8100 distributed processing system is being used for applications being developed by a large Italian organisation - Alitalia, the national airline, and the social security organisation, Istituto Nazionale Previdenza Sociale (INPS).

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### JOB OPPORTUNITIES: Pages 20-39



The Rascal Microelectronic Systems ULA facility at Raud...

## 'Close to ultimate' CMOS venture in the pipeline

EUROPE is to get its first source of the "close to ultimate" technology, oxide-isolated silicon gate CMOS, from a joint venture in the UK between Rascal Microelectronic Systems of Reading and General Instrument Microelectronics in the US.

Silicon gate CMOS features extremely low power consumption and high speed of operation and is superior in performance to the more commonly used metal gate CMOS.

At reduced dimensions, the technology is capable of producing

custom LSI and VLSI devices which could take preference over the microprocessor in terms of both speed and density.

With Rascal's uncommitted logic array, ULA concept and specially developed computer-aided design equipment and packages, companies could eventually obtain custom VLSI silicon devices within a few days.

The two companies, working closely with the Leuven University R&D unit in Belgium, have al-

● Turn to back page

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## COMPUTERVIEW

ICL holds  
the line

GIVEN the choice, ICL would no doubt swap the BCS award pinned last week on its content addressable file store system for an insurance that CAFS will be used for the next big public sector order in the offing - this one for British Telecom.

The telecommunications arm of the Post Office needs a high speed information retrieval system for the UK telephone directory assistance service, Directory Inquiries.

It will be employed by 8,000 telephonists working in 260 inquiry centres all over the country serving Britain's 17 million telephone users. The centres deal with an estimated one million inquiries per day.

An indication that it is favourable for the contract would allow ICL fears that British Telecom may go for IBM, GEC or Computer Consultancy Incorporated, all of whose equipment is under current review.

This is despite the fact that Telecom has already tried CAFS with a great deal of

success at its Leeds and Leatherhead inquiry centres. Trials ran there for a year from November 1978.

British Telecom stresses that it chose CAFS as a trial system, and is perfectly willing to point out to anyone interested enough to ask that "it did indeed perform very well" on a small scale level. But it adds coolly: "We studied the results of the trial very closely before asking the four companies to put forward their proposals."

In truth, this is only what the concerned taxpayer would expect from a public body. But it is clear that ICL has another major battle on its hands for the potential multi-million contract, one apparently tailor-made for CAFS.

It faces especially fierce competition from the IBM Directory Assistance System, which has been sold to a number of telephone companies in Canada and the US.

The battle between these two, with GEC and CCI weighing in, is out in the cold climate of the current market place, unsheltered by single-tender order policies and the like. The policy is soon to run out, but does not apply here anyway since CAFS is not a mainframe and British Telecom, though nationalised is not a government department.

The outcome of the battle will be a better test than the BCS award testifying to ICL's excellence.

## Copyright law

COPYRIGHT, the author's ownership of his work, is something that can be bought, sold - or stolen. While writing and recording rights are clearly protected, the law has not yet caught up with the technicalities of software ownership, despite repeated calls from the industry.

Industry observers were hoping that Zynar, backed by Rank's cash resources, would get into court with a case which would settle for once and for all the indistinct copyright law on software.

But Chris Gary, who would otherwise have found himself the subject of an injunction, has given an undertaking to stop selling what is alleged to be a copy of Zynar's Toolkit, a firmware utility for Commodore Pet programmers which plugs in on one of the Pet's spare sockets.

The Toolkit's implementation on ROM makes it particularly vulnerable to piracy, a disadvantage not helped by the recent Sin-

clair case against Compshop, in which Justice Megarry implied that ROM, being invisible, could not be considered a copyrightable.

Zynar took the precaution of building a case on several grounds; since the shifting sands of software copyright make for a dangerous path to be picked out between ad hoc judgments.

Other recent litigants have also hedged their bets: Sinclair won his injunction on the similarity of keyboard, and Graham Davis Software is currently pursuing an alleged theft of source code on the grounds of "a conspiracy to defraud".

However, the Kansas City Systems are recently indicated a change of heart by law: although settled out of court the order did get as far as an injunction, given by Justice Graham on the grounds that software copyright was infringed.

The implication that there is such a right protecting software is encouraging, in a Zynar's assertion of rights over the Toolkit. But it is not enough; it is high time the law of the land was given substance by the law of the court, either through a decisive case, or, better, through a specifically worded Bill to protect the British software industry.

## LETTERS to the EDITOR

Plaid Cymru  
alternative

THE CW Recruitment Special (October 30, 1980) provided more for Tory, Labour and Liberal Party views on developments in the computer industry.

It might interest you to know that there are other political parties in Britain, and indeed parties with parliamentary representation, which have considered policies on this subject.

This year Plaid Cymru devoted its annual summer school to the twin issues of energy and new technology. Lectures explaining the implications of growth in new technology were given by a number of invited guests. Members of Plaid Cymru have indicated that it is necessary to make a positive response to the challenge of new technology.

Plaid Cymru is deeply concerned with the horrific decline in employment opportunities which has occurred in Wales due to the axing of jobs in traditional and basic industries. At its annual conference on October 22-25, Plaid Cymru declared its strong opposition to the policies of the present government but also stated clearly its position on the question of new technology.

In a comprehensive motion on

employment, the conference demanded that "the maximum growth of employment opportunities in Wales be achieved through differing uses of new technology". Such a declaration is of direct relevance to the recently announced decision to site the first Immos factory at Newport, Gwent. But, in recognition of possible difficulties consequent to uneven development due to new technology, Plaid Cymru advocates "the sharing of wealth produced by new technological processes on the widest possible scale and its use to create socially desirable jobs, in improving the environment and developing housing, education, health and social services."

I hope that the seriousness with which Plaid Cymru approaches the subject of new technology is apparent from the preceding remarks. In these days of growth in information technology, it is to be hoped that there will be a much wider access to political ideas and policies.

Dr K. ALAN SHORE  
Penyffordd,  
Clwyd,  
Wales.

Tom Gilb  
replies

D. LINTHWAITE and A. J. A. McLELLAN insist on important misinterpretation in their letter (CW, October 31) regarding my column of September 11, which introduced the simplification principles I have been treading.

First, I must object that their interpretations of the principles intentionally leave out the distinctions which are clearly in my list. Of course all "simplification" principles say "simplify" in one way or another, in summarising the principles of simplification before treating them in depth, I recognised that some readers would "misunderstand the principles" (CW, September 11) and warned of this at the time. I still feel that there was some sense in the reader, particularly if the letter is collected, in giving this preview.

I would hope that Lintwhaita and McLELLAN have the grace to feel embarrassed about their public outburst, and want to do us all a more constructive service by making specific references to the principles I have expounded: they are not infallible but are merely practical observations from my limited point of view. Or perhaps they can contribute some principles and experiences in simplification.

Kolbotn  
Norway

Turing test of  
info creation

IT seems that a debate has been started on whether or not a computer can create information (Michie's Privateview, CW, October 28).

I propose a kind of Turing test. Let us take three cables, leading to three printers. At the other ends of the cables we put Professor Michie, a computer with a pseudo-random number generator, and a truly random source of white noise (based on thermal noise or random radioactive decay). For several hours, or days, we observe the information produced by these three sources and displayed on the printers.

My prediction is that the white noise source will "create" the most information, the computer will come a close second, and the Professor a clear third.

C. G. PERROTT  
Tongeren,  
Belgium

## Taxing systems

"MICROCOMPUTERS in every tax office" (CW, November 6) is only one of the options we discuss in our pamphlet on the computerisation of PAYE assessment. The final recommendation is better described as a mixture of small to medium-sized business systems using the staff, accommodation and communications facilities which the Inland Revenue already have, or can reasonably be expected to obtain in a sensible time-scale.

Since the key arguments will apply with equal force to a number of major government computer proposals likely over the next few years, I should like to remind your

readers that copies of the full text are now available, price £2.50, from the Bow Group, 240 High Holborn, London, WC1V 7DT. I should also like to point out the arrangements can be made for counter-arguments to be circulated to the full membership of the Group, including 22 government Ministers (eight of whom are of Cabinet rank), and 62 in the House of Commons.

PHILIP VINGO  
The Bow Group

TEN YEARS  
AGO

From Computer Weekly  
of November 18, 1970

ICL, Control Data and CII of France agreed to form a joint study company based in Belgium, to be called International Data. It was intended to broaden and accelerate the three companies' technical co-operation. A plan to computerise the BCS members' records was being shaped, and due to be put into practice by May 1971.

The first Post Office Data Link was transmission link in the Midlands set up between the Bank of England and the Bank of Ireland.

The US Navy ordered two more computers, worth £1.1 million, to be bought by the Government expected to have the year to March 31, 1971, for the year to March 31, 1971.

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## Trade mission out to sell 'Aztec West' to the Americans

TAKING coals to Newcastle? A British team is out in California this month to promote Silicon Valley, Bristol, otherwise known as Aztec West. The aim of this trade mission is to attract further US investment to the 200-acre development site near Bristol.

Aztec, derived from the A to Z of technology, flourished from research carried out worldwide showing that high technology flour-

ishes best where facilities for the good life now, go hand in glove with scope for growth.

ESN, the pension fund of the electrical supply industry, recognises the potential of the Bristol site and bought the land in 1979. Construction is on the modular style to ensure flexibility.

Work started this autumn and will eventually culminate in 1½ million square feet of industrial

space and 500,000 square feet of offices and recreational facilities.

Development is expected to take five to 10 years, and on completion Aztec is forecast to become one of the most important high technology campuses in the world.

Bristol is particularly well suited to industrial projects such as Aztec, with sea and country within easy reach and the nearby universities of Bristol and Bath to act as a

source of skilled engineering staff.

The recent loss of the Immos manufacturing plant in South Wales, was a blow to Bristol hopes, and Mike West, industrial development officer for the Avon area, admitted that manufacturing jobs have been cut from 39% of the total in the early Seventies to 29% currently. Like other parts of the country Bristol needs the injection of 2,000 new jobs in industry.

However West remains optimistic and firmly expects to see the creation of 3,000 jobs over the next two years.

"Three US companies," he said, "are likely to move into the area shortly."

During the last year several large companies - Fairchild Instruments, Marconi Avionics, Sperry Gyroscope and Nexus - have opted for Bristol.

AEG signs  
licensing  
deal with  
Mostek

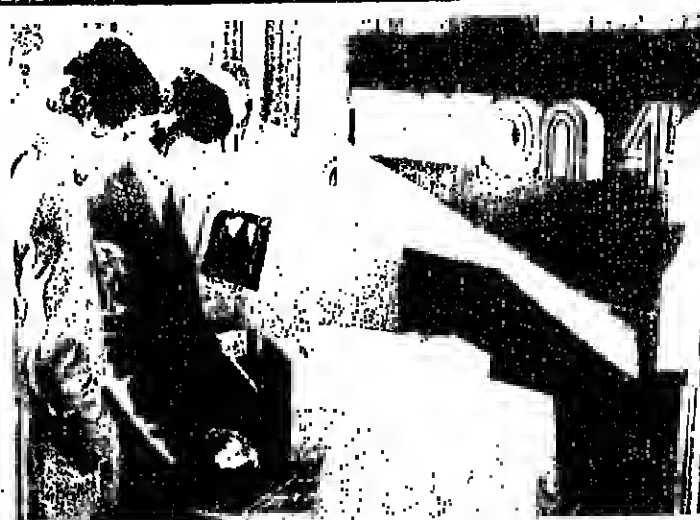
WEST German electrical and electronic components group AEG Telefunken, is to produce the Mostek 3870 eight-bit microprocessor for the European market under an agreement with the US company.

Production of the chip will take place at Telefunken's electronic component plant in Heilbronn, a small town just outside Stuttgart.

Volkmar Schladach, sales manager for Mostek Europe, said: "The 3870 is of our own design and we entered the agreement with AEG Telefunken so that our European customers will have a second source of supply."

The patent agreement with Mostek comes as a fillip for Telefunken, which got into financial problems last year and had to borrow funds from several banks.

Mostek has patent agreements to manufacture the Fairchild F8 eight-bit microprocessor, Zilog Z8 and Intel's 16-bit micro, the 8086.



Charlie Blake, of Trivector Commerce demonstrates Triton 4 at its launch event at Woburn Abbey.

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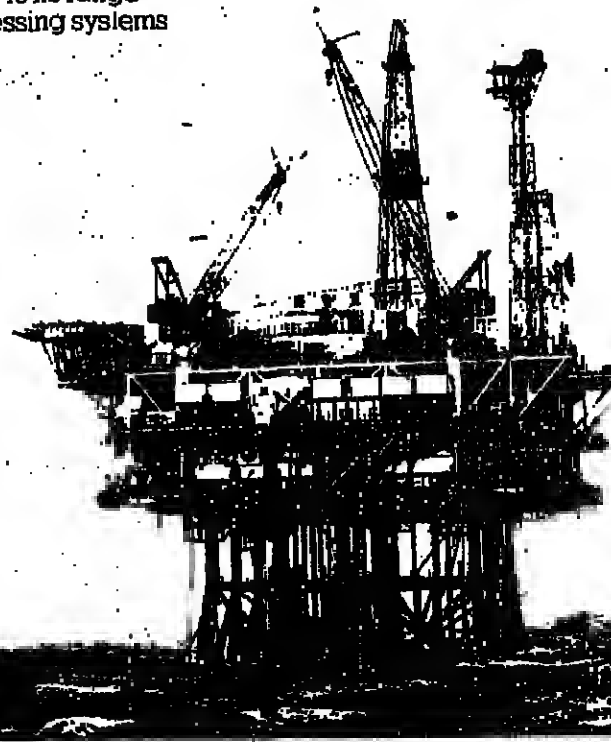
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## FOCUS

### Wrong bus?

THIS year's president of the British Computer Society, Mr F. J. Honper, has confided that he is worried technology is outstripping the capability of people to cope with its application with the degree of confidence and ability which the Ordinary Man on the Clapham Omnibus has been led to expect.

There is a chance, however, that Hooper and the BCS have been travelling on the wrong bus.

The ability of the non-DP professional in absorb computing technology is a confirmed fact of life. Just win was it who operated the original desk-top accounting machines and minicomputers? Who now operates the small business machines and the herds of Mighty Micros being introduced into non-DP specialist environments?

As the BCS will recall from their earlier involvement in microfairs, far from being hesitant or reluctant to grapple with new technology, society of large appears only too eager to get to grips with computers. Interested parties at such gatherings range from schoolchildren to the enthusiastic businessman, plus not a few hobbyists. The BCS should perhaps take a closer look at the office desk. Chances are that each individual is coping with his terminal, VDU or micro with considerable confidence and ability.

**Pace**

Hooper went on to suggest that the ultimate emergence of an electronic environment such as the automated office is fraught with danger. Whether office workers see the inherent dangers in the same electronic light is far from certain. Given the choice of manual ledger accounting, cumbersome filing systems and typographic comprehensive legal documents, few would demur at the introduction of a micro, an electronic mailbox or a word processor unit into the organisation.

The BCS is not, however, alone in its approach. The NCC has announced that it is to conduct a study to investigate the effects of the new technology on managers' jobs. Maybe there should be a public work-in seminar to reassure the leaders of the computer industry that, far from being uneasy, the average citizen is more concerned with the pace of his Clapham Omnibus than the pace of DP technology.

## Oh for the quiet life!

**Downtime**  
by Chad

I OFTEN wonder about this amazing microelectronic world of the future we keep hearing about. Everything will work beautifully and there will be nothing left for us to do, or so we are told. Then I go out into the world and try and do something with electronics, and I start thinking maybe the forecasters live on Mars — they certainly don't live here.

My latest saga goes as follows: I decided it would be nice to have a telephone answering machine — friends keep complaining that I am never in to answer the phone and I convince myself that I am

missing lots of exciting party invitations. So I trundle down the Tottenham Court Road, where there is a glittering array of such devices, and choose one, a GMTC model, which is described as "computer controlled" and is in fact very clever.

It is highly automatic: it does all the thinking and fiddling for you and you can even call in from another phone and make it play back your messages to you. Great! So I take it home and there it is, installed by the phone in my study/bedroom.

There the problem appears. I discover

that while it is sitting there waiting for calls, the machine makes a clicking noise. This noise is inaudible in a crowded shop, but at home it is enough to drive you bananas, while you are sitting at your desk trying to work or lying in bed trying to sleep.

So what do I do? I switch it off. Then I go out, forgetting to switch it on again. Or I go to the loo, thinking it will answer the phone and of course it doesn't. Clearly the whole idea is to leave it on all the time; that way you can decide to be anti-social and not answer the phone for a while even

when you are in.

I go screaming up the wall at the idea that this microchip can do all these clever things, but not make it quiet! How could I have thought of this requirement for silence before I bought it? The manufacturer apparently didn't: my machine has no defect.

All these machines make the noise to a greater or lesser extent. So what can be done? Will Chad be granted a happy issue out of all his afflictions?

Wait breathlessly with me to see, dear readers.

## Competition 80 Winner

A LARGE, witty and ingenious entry to our Competition 80 (CW, October 28) exercised Don's mind wonderfully, and results in £50 and the signed original of this Livewire File going to T. Loudon, Institute of Geological Sciences, who lives in Selerno, Midlothian.

HOW PLEASANT 'TIS TO TRIP THROUGH COMPE...



...AND ONLY MAN IS...



PUNCHED OFFLINE



...AND ONLY MAN IS...



...AND ONLY MAN IS...

## GILB'S MYTHODOLOGY

### Simplify by using two solutions

SOME problem solutions become unnecessarily complicated because we attempt to solve extremely different problems with a single "simple" mechanism or solution. This kind of solution simplification will often lead to hidden additional costs and mechanisms. These additions, often coming after initial implementations have performed poorly in actual operation, are necessary because of the conflict involved in trying to satisfy widely different needs with a single solution.

#### For the masses

The way to achieve real two simplification is often to have two or more mechanisms: one for each of the widely varying problems. I sometimes state this design principle as: Design for the masses, then design exception solutions for the exceptions.

Here is an example: A Swedish newspaper designed a way of uniquely identifying a subscriber for telephone inquiry into questions like: "Why didn't I get my paper today?"

They had well over 100,000 subscribers to consider, including lots of Olssons.

Some of you would have designed a "subscriber number" of digits, conveniently ignoring the problem of the subscriber actually

finding the number before ringing the newspaper. Some readers might have tried to access the subscriber record by means of name and address, but most would have required a minimum of eight and probably many more characters keyed in, in order uniquely to identify the subscriber.

I am not just guessing at these answers. I have asked a few hundred course participants to solve this problem. Few of us would have come up with the elegantly simple and efficient solution actually used.

The solution makes use of an average identifier keying of about 4.2 characters. Four characters for the "masses" of inquiries, and a fifth depression for exceptions (about 20%). Before you read on, you might like to take a guess at how this was accomplished.

The solution uses a three stage rocket, combined with some natural selection of unique identifiers. First, if the subscriber identified himself as Tom Gilb from Kolbotn, the online terminal operator would key in something like GJ KO. This would give either a unique record, or at least the correct record in a list of similar records on the screen (like a page of Gilbas and Gilberts in a telephone catalogue). Visual operator eye selection can at this stage answer many questions, like: We have stopped delivery because no payment has been received.

Each subscriber on the page is assigned a unique one-character code, and a fifth key depression gives the unique record selection and full record display, which is necessary for certain inquiries and for updates.

There are some hidden principles in this solution. The first is that people calling a large newspaper will normally try to give an identification which will be unique at that institution. If my name is Jones on Main Street, then I know that I must stress that I am Percival C. Jones on 234 Main Street (the operator might key PJ

23 or JO 2M depending on how sophisticated a set of rules you want to use to match against your records).

The second principle is that the online terminal operator can be allowed to use his or her common sense to select a few characters from this information. JO MA (Jones main) is likely to select well, while PJ is likely to be more successful.

The operator can begin a degree of freedom. We don't have to match against a single unique "right" code.

The third principle is that we don't have to access records uniquely by electronic logic alone. It is often sufficient to let the fast access be by means of an operator's eye scanning a page.

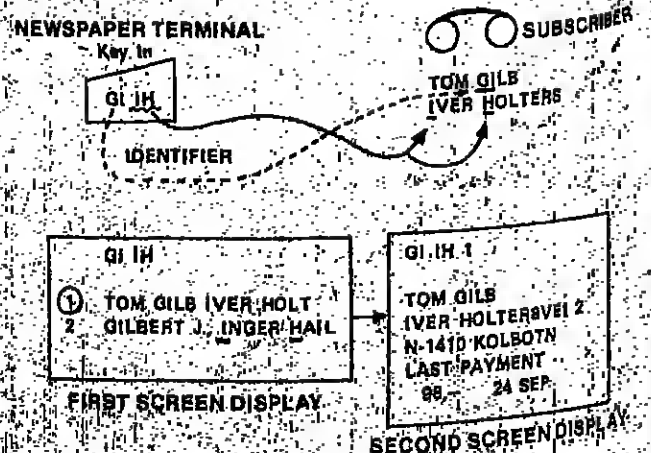
In addition to these natural selection principles, notice the three-stage rocket: two characters from the name are used to select (1/900th of file) a "page" of subscribers with similar names. The stage two, the next two alphanumeric characters (roughly 40 x 40 combinations, or of ten smaller division into 1/1600th position) are used to select one or a few of the subscribers on the "page" (for example "GJ") page. Finally, a character (very exceptionally two) is used to select, if at all necessary, in order to answer the enquiry, a unique subscriber record.

More perfect

A fourth hidden principle is that the design here uses information which is natural for the applications (the name and address listed or delivered to), which the paper and the subscriber must normally know.

Naturally we did not simplify the programming or the hardware here. We simplified the human work process at both ends of the system. Sometimes simplification is a matter of your priorities: "where will simplification pay off the most?"

Hypothesis: Systems can be made more perfect if we don't try to make them completely perfect.



## Toshiba launches 16-bit SOS micro

JAPANESE company Toshiba has announced a 16-bit microprocessor based on silicon-on-sapphire technology. This means that both GEC and Toshiba are continuing research and development in SOS, even though Hewlett-Packard, the only manufacturer previously to have concentrated in the area, has opted out of advanced research (CW, September 18 and October 9).

The T88000 uses a 10MHz clock with gate delays of around 0.7 nanoseconds and operates five times faster than MOS processors like the Intel 8086 and Zilog's Z8000. The high speed is obtained

with line widths of 3.5 microns. With MOS techniques line widths of 2 microns would be needed to achieve the same sort of speed.

### Pipelining

The device has about 12,000 gates, and with the bigger line widths, the whole chip area is larger than normal, around 50mm<sup>2</sup>. Speed is not the only advantage that SOS has over bulk silicon: power dissipation is about a quarter of that of a similar bulk silicon device, about 700mW.

Two parallel 16-bit buses make the processing speed twice that of a single bus and the T88000 has a pipelining ability, which also speeds up processing. While one instruction is being executed, another is fetched, thus saving time.

The data bus has a 32-bit input/output structure and the T88000 can address directly 16 megabytes. A 16-bit by 16-bit hardware multiplier increases the execution speed of multiplication to around 1.6 microseconds, or four machine cycles. This compares with up to 100 machine cycles for software multiplication.

## TELECOMMUNICATIONS USERS' FIRST CONFERENCE

### 'Information technology vital if UK industry is to compete'—warning

IF UK industry is to keep up with its competitors abroad, it must cut office overheads by investing in information technology, the Telecommunications Users' Association heard last week.

Speaking at the TUA's first conference, British Telecom deputy managing director John Harper said that the potential for exploiting telecommunications was enormous and the Germans, Swedes, French and Americans had seen this already. It was a disgrace, he said, that more people did not know about electronic offices.

### United

British Telecom was not an enemy to users, Harper said. It was a servant which did not feed shareholders but tried to optimise the running and finances of a network which belonged to the community. Any excessive profits were returned to users.

The new situation created by impending legislation on the monopoly united more than it divided British Telecom and its users, and the package of services being prepared would create a need for co-operation rather than for debate.

The government had approved 85% of BT's investment requirements for this year, replacement of Strowger exchanges in London was halfway through, and waiting lists for the supply of private lines in London had been reduced for the first time in many years.

Private circuits on order had peaked in August, but had then turned down and now stood at 21,570. Exchange lines waiting

had been reduced from 125,000 in May to 108,000 now, and telex lines from 5,600 to 5,300. Lead time on delivery of telex lines was now 10 months, but it was planned to reduce it to three months by next September.

Many delegates were worried about the thriving trade in illicit telephone attachments now going on. Harper said British Telecom had soft-pedalled its response so as not to appear to oppose the ending of the monopoly.

When a subscriber had been found using one, for example when it caused a fault on the line, he had been informed it was not a permitted attachment and usually he disconnected it voluntarily. If the subscriber told the engineer to "get stuffed," the policy was now to disconnect his line.

### Danger

The biggest single danger to the revenues of PTIs in all countries was from the carriage by private companies of third party traffic internationally. There was concern about this up to CCITT level, Harper said.

Department of Industry telecommunications head Bill Wigglesworth said international services were subject to international agreement and he knew of no approaches to CEPT, the committee of European PTIs.

## Telecoms trading is discussed with EEC

TALKS have begun with the EEC Commission and foreign governments to prepare for reciprocal trading in telecommunications products and services when British Telecom's monopoly is ended.

Opening the Telecommunications Users' Association conference, the new Information Technology Minister, Adam Butler, said that the GATT agreement and the EEC regulations on free trade should allow scope for reciprocal trading agreements.

Imports would not be encouraged where there was no reciprocal arrangement; the government was not throwing open the gates to international manufacturing competition in one direction.

The government's aims in dealing with the monopoly were to ensure the best possible telecommunications service to business and the general public and to stimulate industry to exploit to the full the opportunities presented by information technology. It supported British Telecom's plans to invest heavily in its network and was fundamental to the continued growth of information technology. There might be some scope for

competing transmission systems, for resale of capacity on British Telecom's networks and for third party alternatives to British Telecom's network services.

Professor Michael Beasley, of the London Business School, has been commissioned to study these issues, because although profit-making might undermine the preservation of a widespread service, a rapid increase in traffic might justify the competition. The theoretical maximum was total freedom.

### Construction service

CMG (West End) has formed a division to deal with computer services for the building and construction industry. The division's services will include assistance with selection of computers, the provision of bureau-based facilities and the development of specialist systems.

## Russians catching up with US in microelectronics

FROM behind the Iron Curtain emerges a microprocessor which, at the moment, is only three years away from current US standards in the design and production of microelectronics. The gap was thought to be at least ten years.

Control Data in the US has obtained through Hungarian sources a Soviet microprocessor similar to the Intel 8080A 8-bit single chip microcomputer. Experts at Control Data say that the Soviet device, the K5801K80.77, is a genuine production device probably using the Intel part as a model.

It seems that new photolithographic masks have been developed, as experts say the line widths are larger than on the Intel chip. This is thought to have been done at Zelenograd, 90 miles north-east of Moscow, known as the "Silicon Valley of Russia."

The Russians have also used more robust packaging indicating the harsher industrial environment in which their microprocessors are used. The device is housed in a stronger, more reliable ceramic flat pack.

The Intel 8080As were bought legally from Munich

by Videoton, a Hungarian national computer company, which has had a long-standing trading relationship with Control Data. The company specialises in producing data terminals for the Soviet Rigid line of computers.

Videoton indicated to Control Data that if and when it decided to put the terminals into production it would not use the Intel part, but a Soviet copy of it. It then gave Control Data a sample.

Soviet computer output last year was thought to be worth about \$6 billion. This is the size of the US computer industry without IBM.

### Council dispute

THE dispute at Tyne and Wear Council, where Nalco is pushing for a new technology agreement, is to go before the North Eastern Provincial Council, a joint union-employer negotiating body. As reported last week, Nalco is refusing to let its members operate a Bitly word processor installed in the Tyne and Wear Architects' Department.

## The copyright furore

### From front page

put up with that sort of rip-off. This situation is very bad for the UK software industry — it's disadvantageous to the development of the trade."

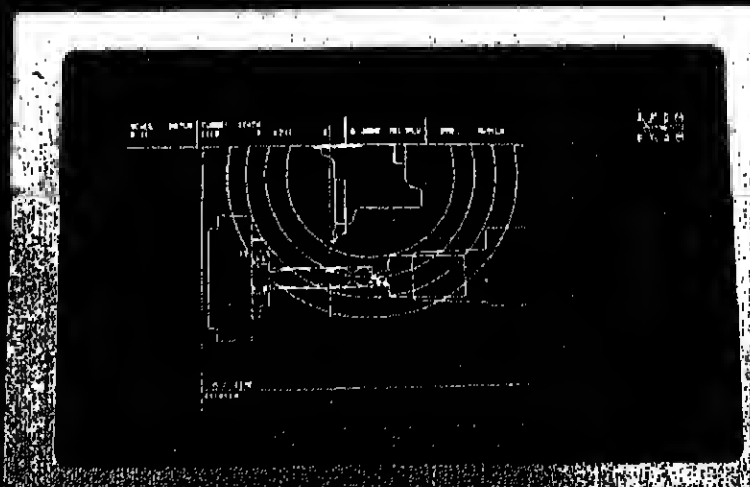
Chris Cary is away in Ireland for two weeks, but a spokeswoman for

Compshop said: "We've stopped selling it after we had a note from them."

She stated that Compshop had to go to another source — "I haven't a clue who the supplier was" — after they were unable to buy the Toolkit from ACT Microsoft.

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# PROGRAMMERS' PAGE

## Brain-teasers — human v. computer approach

THERE'S this tall office building with tinted windows. Inside, on the ground floor by the lift, stand three anxious programmers and three representatives of management.

They are having talks about possible redundancies which have to be settled by the time all six reach the director's office on the eighth floor. The only way to get there is by the ancient lift which will carry two persons max. and needs a minimum of nine to operate it.

### Series

Company rules state that if management outnumber the programmers at any time, either on the ground or the eighth floor, the programmers will be made redundant, and whichever floor the lift is on, its passengers are counted as being on that floor. The task is to get all six people up to the eighth floor in the smallest number of lift journeys and with no redundancies.

Is your mind ticking over, already rocketing the programmers skywards and back to avoid their fate, or have you consigned them to redundancy with a shrug?

Problem solving is integral in the job of programmer or analyst, and is a great part of the attraction. There are almost as many ways of reaching the final solution as there are people, and this week 'Programmers' Page starts a series on types of problems, the approaches that different people use, and the mite the computer takes to the same solution.

A first look is at the brain-teaser, and future weeks will continue with board games such as chess, universal problem-solvers of which the main two are leucistics and means-end analysis, and finally turn to artificial intelligence techniques for a bit of problem-solving tools in the form of a programming language — not Cobol or Basic.

Meanwhile, back at the lift-shaft, there is one mistaken assumption which will prevent you reaching a final solution. Have you spotted it?

Figure 2. A search tree.

One approach is the good old trial-and-error, and using it you may get into a loop where the only available move brings you back to the original state (see Figure 1). Talks reach deadlock!

Alternatively, in your shuttling back and forth you may have successfully lifted two managers and two programmers to the eighth floor, but are now stuck. Sending two back — one would result in an illegal situation — goes against the grain and intuitively feels like a retrograde step. It looks suspiciously like another loop.

Any of these situations involves back-tracking and undoing some previous moves in order to try new ones. In strategic terms this is a "search tree" (see Figure 2).

The tree is grown, and shaped, by the particular strategy used to

seek the solution. Humans employ a variety of ways, including trial and error and intuitive guesswork. Computers preferentially would be directed to one of two strategies — the depth-first or the breadth-first search.

In the depth-first search, each pathway is explored to its bitter end. The search is essentially a plod through each path, completing one before turning to the next.

A computer working systematically to solve a hierarchy of moves, it will keep trying the first move until this fails and it is forced to adopt the next alternative. Once this has been made and a new problem state produced, the search returns to the first preferred move.

Programmed with a hierarchy of lin, 2p, 2m, 1p, 1m, the computer sets off at node 1 by extracting one management rep but detects by a loop-check the dead end of node 3. It backs up the search to node 2 for an alternative, but none is possible.

Another backtrack to node 1 results in lift-off for two programmers but leads to redundancy

Figure 1.

notices on the ground floor, so back to square (node) 1 again for the third hierarchical move, 2m. This seems to work and allows the hierarchy to start again, eventually producing a loop at node 7, an illegal state at node 8, and signs of a breakthrough at node 10.

### Shortest

In the complete search tree (see Figure 3) there are four possible solutions, and each can be reached in a minimum of 11 moves.

The strategy has certainly got us there, but is it the shortest solution, or is the lift burning up the shaft? Short of growing the whole tree and comparing paths, there is no guarantee that it is the best.

The breadth-first search accommodates this by looking at all solutions simultaneously. All the states reached by one move are grown, then all those by two moves, by three moves, etc. The first solution found is bound to be the shortest, though not necessarily of the same node pattern as the depth-first tree.

One more variation is the backwards search, working back along the pathways from the final solution. This guarantees that any path followed is not a dead-end or a loop. However, in practice the answer is not always known before-hand, and in theoretical terms not all pathways lead back to the original state.

A backwards tree for moving the band of six from the ground to the eighth floor would be exactly equivalent to the forwards tree for moving same from eighth to ground. So "backing down" gets the programmers nowhere.

Computers are excellent at solving this sort of problem. While a human is still herding the first two

people into the lift the computer has the whole lot neatly packed up in the director's office, without a whisper of the word redundancies. The difference is in memory capacity. Having eliminated branches leading to loops or illegal states, the computer can follow each path exhaustively to its end. Humans, having limited memories, find it difficult to keep track of all moves down even one path, or to foresee where a move may lead them, so are advised to resort to intuition.

Strictly speaking, they do not follow either a depth-first or a breadth-first strategy but tend to concentrate on lengthening a single path, chosen by hunch, which they are often reluctant to let go.

At one point in the problem, 2m, 2p, and the lift are on the eighth floor, leaving 1p and 1m at the bottom. Gut feeling would tell you that having got four people upstairs it would be a pity, and probably counter-productive, to bring two down again, back to a previous state. An assumption is made on past experience and the move discarded.

It is, in fact, a vital move. The important difference is that the lift ends not on the eighth floor but on the ground.

Brain-teasers and trick problems are characteristically similar to more common problems but contain a twist that makes the usual solving techniques inappropriate. So lurches that would normally work, are liable to lead up astray.

Some humans make the false assumption in the redundancy problem, and refuse to take the retrograde seeming step. Next they fall to find a solution.

The computer has no such inhibitions.

by Pamela Rowe

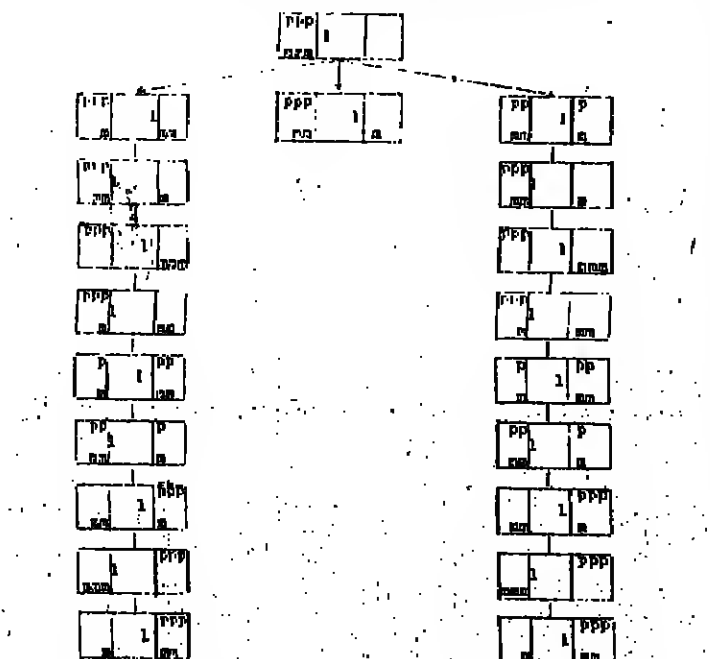
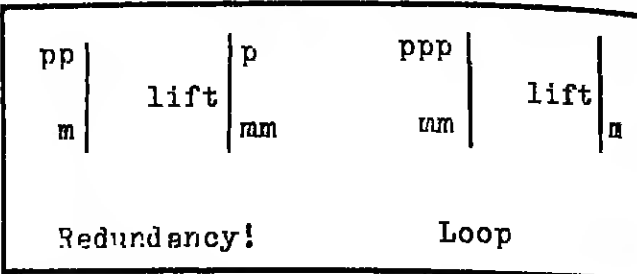


Figure 3. The complete search tree without loops or illegal states. All solutions are 11 moves long.

## Agents have a point of view too

ARE you thinking of turning contract? Despite the gloomy times? If so you may have pondered on some of the questions put in and answered by Jim Kane, managing director of Computer People, one of the VLI Group of recruitment companies.

The most often posed question — why don't agencies pay higher fees and rake off less commission? Said Kane, "Nobody loves an agent. It's a question of running costs, for instance to cover a weekly payroll whether or not the client has settled his bill. Contract staff are also protected against the client going bust — the agency bears the expense."

Also, why no holiday pay? "Sometimes a bonus is given at the end of a contract as a sort of holiday pay, but invariably the weekly rate is lower. Most contractors seem to prefer the highest rate available."

Why are contract staff so often over-qualified for jobs they are sent on? "The client needs to know that

the contract worker is capable of doing the kind of job that often arises as an emergency. There is no time for on-site training so it is better to be over- rather than under-qualified. A contractor on his side can always find out about the level of the job and turn it down if necessary."

Why don't agencies back-up contract staff when problems occur? "It's the agency's task to sort out grievances between contract staff and clients, and a contractor with a reasonable complaint is always supported. However, we do expect to be told about problems before the client, so that trouble can be nipped in the bud."

J. K. had the last word "Far from being footloose and fancy-free, your average contract programmer is married, has at least five years' solid DP experience behind him, and is in the 24-32 age bracket. Their biggest worry is that they are too often over-qualified and under-employed for the jobs they are assigned to, but over 70% intend to carry on contract work for at least two years."

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# SOFTWARE FILE

## Protection for micro users

A NATIONAL association is being set up for software houses specialising in tailored programs for the small business end of the market.

As well as setting standards for the industry, its concern is to protect the users — predominantly first-time computer users — who invest £12,000 or under in a microcomputer to help run their business, only to run into trouble with software which does not do its job.

The aim of the Software Producers' Association, called SPA, is to provide a range of high quality software packages which will be guaranteed and supported by members throughout the UK. Part of the plan is that program packages endorsed by SPA will have a money-back guarantee and all programs will be tailored to the user's requirements and supported by a maintenance contract.

### Rules

Another aim of SPA is to link specialists in different areas of the UK so that customers can go to a local dealer for purchase and support. Specialised areas such as systems for garages, market research, auctioneers and farmers could then be marketed nationally through agreements with their authors.

The rules for membership are still being worked out, but Wills intends that the association should grow slowly, partly through the personal recommendation of users and hardware suppliers. Members will be judged on their standards of writing and support, and invited to contribute software if their methods come up to scratch. Membership can be terminated

if the support given by a member fails to meet SPA's standards.

Enquiries about SPA can be answered by Peter Wills, 0272 312079, or David West at Chess Consultants on 061-832 6792.

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# Teleprocessing offers a career path to ops

PASS any office block and you can be sure that inside are grown men and women brooding, plotting and generally worrying themselves over their computer prospects. For operators, or ambitious ones at any rate, the promotion ladders often have a special note of paths because there is no obvious career path beyond the post of ops manager.

One way that ops can make themselves more important, in their own eyes and to everybody else, is to get smart when they learn that a teleprocessing network might be established around their installation.

## Status

To an operations department as a whole, teleprocessing is viewed both as a challenge and a threat. Within data preparation and control it represents a reduction in workload and a corresponding drop in staff. Within operations itself, it brings more kit, more status and demands a change of role. At one level this change of role is on a day-to-day level. For example, during the day shift teleprocessing will bring less batch

work (possibly none at all) and operations will concern itself with maintaining an online system. Whether it is an inquiry, a remote job entry or a real-time system, the user has more direct contact with the central machine and will therefore know what effect the ops department has on that machine.

A teleprocessing system means that operations can no longer hide behind a user liaison area or well-cushioned batch scheduling.

For the career minded empire builders among ops, the change in role has the effect of giving them a foothold on the management hierarchy. Perhaps the real challenge of teleprocessing to operators is that whoever services the network must know more about the hardware and the business it serves.

If something goes wrong it is no longer enough for the ops to peep into a run dependency manual and then shout for engineers and support programmers. With teleprocessing there are many horrors which an operations team must recognise and plan for.

The teleprocessing system breaks down... the warehouse is unable to pack orders... the production line, starved of parts, falters and sources of workers are left twiddling their thumbs... such events are all too likely and pose questions to the ops department which it should leave the knowledge to answer.

## Consultative

How do you create a productivity scheme for factory hands which allows for computer breakdown? This would be particularly difficult if their shop steward had already seen a reduction in the clerical staff he had previously been looking after. But it's the kind of management decision which, at the very least, demands that operations has a consultative role.

The nature of teleprocessing gives an ops manager a good deal of potential clout.

Many installations do not provide the necessary skills and authority for the ops manager to participate to any significant degree; it is difficult to pin down

precisely why this is so. Sometimes it is a well-staged plan by development to retain or even claw back control. In other instances it is a reluctance of general management to recognise the ops manager as anything more than a jump-up machine minder.

Such an attitude is common and perfectly illustrated by the sites where the ops manager is not dignified with the title of "manager" but has to be content with "supervisor" or "controller." It's the class system rearing its wrinkled old head.

## Challenges

More easily remedied is the reluctance of ops management itself to accept responsibility for teleprocessing users. Are they in to see themselves merely as managers of their own little cabbage patches and feel all nervous and humble when they poke their heads out of the computer room? Or as managers in the context of the company where they work?

This is a subject near to the heart of Phil Cartmell, from Infotech Operations, the Maidenhead-based training organisation. He believes that teleprocessing belongs to the operations department and sees it as giving ops managers technical and psychological challenges which many of them are not prepared to meet.

"I can count the real managers in ops that I know on one hand," he says. In his book the real managers are the people with ambi-

# 'Persuade them you are a manager'

EARLIER this month Thomas H. Farello, an American employed as a management consultant with Ford, Bacon and Davis, gave a three-day seminar, organised by Frost and Sullivan, on the effective use of computer operations management. And he chewed over much the same problem as bothers Phil Cartmell, asking "How are we to manage?"

For a start "objectives" had to be defined and everything had to be "effective" in dollar terms, but these are general conditions of life

on this planet. I was only there for the first morning and left before the talk became too technical.

Farello, seemed an effective teacher and had the 25 participants, all of whom were concerned with ops management, grouped in a crescent rather than hiding behind each other to rows.

"You'll never win anything by emotion," said Farello, "you'll win it by facts; by the management meaningful numbers that they understand."

Central to Farello's argument was that management looks at operations people as technicians and not as managers.

"I strongly suggest that you as



CARTMELL: "Operators don't seem to realise there is anything bigger for them."

Cartmell is swift to ask whether it is fair to expect that ops should show initiative and accept responsibilities as well as operating a mainframe. His answer is naturally enough, is that ops must be trained to the job — and such a training is provided by Infotech.

## Qualities

Infotech is anxious to promote the position of network controller, who is not envisaged as a keen lad with a screw-driver but as someone able to decide priorities and who can deal with both people and machines.

If ops are restricted to doing monkey work they are going to be treated like monkeys and can't expect much better. If they become the kind of all-rounders that Cartmell suggests they should be, there would be no ground for the recurrent gripe that they are everybody's nobody.

Teleprocessing is certainly something where ops can get involved as managers as well as workers, and promises a jump in status for those who take the chance.

# Keeping the customer satisfied

THE purpose of an excuse is to give a reason why something has gone wrong. For many clerks paid to catch flak on behalf of a large corporation it often doesn't matter if the reason is true or false. What is important is whether the reason is plausible enough to send a screaming punter on his way.

One of the surest and most intractable excuses known to modern man is to blame 'The Computer'. The ACM (the American equivalent of the BCS) formed a sub-committee to investigate what behind a batch of such excuses, it should have come as no surprise that in one case it was discovered there was no computer involved at all.

## Phantoms

However, sometimes the computer — or those who told it what to do — is involved. Recently an insurance business appeared to be generating millions of pounds of loss. It was eventually traced to a set of phantom record files. The same company had an inexplicable trickle of income. This was traced to an old lady. There was no test logic in the system to account for the fact that she had 'carried on paying her husband's life insurance premium years after his death.

The moral of this is that while some excuses are more plausible than others, the computer excuse is the most plausible of all.

## CONFERENCES

### New directions for NATO

A CONFERENCE covering new directions and forecasts for NATO will take place at the Royal Astronomical Society, Lecture Theatre, Hamilton Place, London SW6, December 1 and 2. Sponsored by the Technical Marketing Society of America and the Technology Transfer Society, the conference features experts from the US Army, Air Force, Marines, Defense Advanced Research Projects Agency, and US European Command, who will look at the entire weapons spectrum and combat vehicles.

It is called Battlefield Weapons Systems and Technology and the fee is £235. Further information from the Society of the Arts, telephone 01-242 4045.

SOUTHCOON 81 makes its debut at Atlanta's Georgia World Congress Centre from January 13-15. It is aimed at design and specifying engineers in electronics, as well as those involved in design and specifying for the furniture, textiles and appliance industries. The conference is two events in one: an exhibition for manufacturers, suppliers and distributors of electronics-related products; and a professional programme featuring presentations by scientists and engineers involved in electronics and new ideas in high technology. The event is sponsored by the IEEE Region 3, Atlanta section, IEEE District Council, IEEE Region 3, IEEE District Council, IEEE Region 3, IEEE District Council, IEEE Region 3, IEEE District Council.

ROGER VALLO, president of GTE Communications Systems, Systems, and Frank Yung, chairman of Singapore, will address the opening plenary session, which will be held in conjunction with the third Pacific Telecommunications Conference, to be held from January 12-14 at the Hilton Hotel, Honolulu, Hawaii. The conference is organised by the Pacific Telecommunications Council, will feature a panel discussion on telecommunications in China and a live teleconference discussing government and business perspectives on telecommunications. For further information, contact Richard Barber, conference director, on Honolulu 938-2111, ext. 27, or write to PO Box 23148, Honolulu, Hawaii, HI 96822.

## MICRO NEWS

# Education 20% of market by 1985

SALES of microcomputers in the US education market will approach a retail value of \$350 million a year by 1985, and account for 20% of the total microcomputer market, according to a report compiled by Creative Strategies in the US. The overall compound annual growth rate is expected to be greater than 30% for unit shipments.

The report, Microcomputers in Education, analyses the market for US systems costing under \$15,000 which meet certain design requirements. It states that 13 companies produce over 98% of the market, and seven others have possible potential for competing. At least 50 companies meet these requirements.

## Shift

According to Creative Strategies the emphasis has shifted in the educational market from hardware features to software applications packages, better distribution methods, leasing, service and warranty programmes.

The report predicts that software sales should rise by an average of 28% over the next five years and that this growth will be fast for the first three years and slower in

the last two. The introduction of classroom software packages will stimulate sales of additional systems and more software.

Peripherals are expected to grow at a rate of 40%, due to greater use of floppy disks and printers in networked multi-user installations. Packaged systems should exhibit a compound average annual growth rate of 26%.

In the US, however, the report predicts that the present potential market will be saturated by 1987, given the current growth rate. It is likely that the number of potential users will increase over the next five years due to the increasing penetration of educational institutions and the expanding use for microcomputers in education.

Of these 13 companies, market shares in the overall market: Tandy leads in terms of unit shipments; Apple leads on sales figures; while Commodore takes a large portion of the balance. These three account for 85% of the total shipments to US educational establishments.

Others mentioned in the report that are participating in the education market include Atari, Texas Instruments, Cromemco, Hewlett-Packard, Intertec, North Star,

Ohio Scientific and Vector Graphics. Those not yet involved in this market include CompuLink, an associate of ACT, Onyx, Perlec, Sord and Zilog.

The report defines the various ways in which microcomputers can be used in education — firstly, the business aspect. Microcomputers for administrative purposes represent 5% of total microcomputer use in education.

In educational research, microcomputers represent 1% of total use, but this is increasing with the development of improved graphics and specialised software.

In the classroom, microcomputers can be used in three ways: computer assisted instruction, computer programming instruction and instruction in computer fundamentals. Classroom work represents 90 to 95% of all educational use.



A BUREAU service for use with the ACT Series 800 microcomputer (pictured above) is to be launched at the Whizz Computer Show to be held at the NEC in Birmingham next week. ACT is also launching a new range of business systems based on the 800 system and called the 850. At the top of the range the 854 and the 855 are based on 8-inch disc drives giving 2.4M-bytes of storage. The basic model in the range, the 852, comprises an

# Texas bid to boost 'talking' sales

SALES of Texas Instruments' 99/4 talking home computer in the US have been disturbing enough to warrant the company running a rebate programme. But, according to TI retailers in the US, the programme, which was meant to help boost sales, has not generated the desired consumer interest.

Initiated three months ago, the programme has just been completed, and dealers are awaiting the company's next step. Meanwhile, at least two dealers have already discontinued the product, and others are considering doing the same, because, they say, it is overpriced and lacks software.

According to TI, sales in the UK have "not been high", but the company puts this down to the fact that the PAL system is not yet available. For users to operate the

99/4 in the UK at the moment, special monitors must be incorporated into the system, which respond to both the US colour standard, MISC and PAL. This puts the price up to about £1,000.

## 'Too high'

US dealers are complaining that the price in the US is too high; it is listed at \$950 for the console and \$450 for the monitor. The rebate programme offered a \$100 reduction on the price of the hardware, with \$100 worth of software free. But the only software available at the moment is educationally oriented.

The 99/4 system with PAL will become available in the UK next year. No programmes for boosting sales in the UK have yet been planned by TI.

# Speech chip from GIM

A SPEECH synthesis chip which can run two methods of voice production including linear predictive coding — the one used by Texas Instruments' 99/4 — was announced by General Instrument Microelectronics at Electronics 80 in Munich last week.

The SPO 256 operates mainly in the phoneme mode, but can also use the LPC method for good quality speech in phoneme coding, words are stored into the 64 building block sounds, or phonemes, of the English language, and put into memory. On recall of a word, the phonemes are selected with the help of computer logic and constructed into the given word.

Available for £10, the SPO 256 has 16K-bits of ROM built in to the 28-pin NMOS device, which can reproduce up to 256 discrete sentences (words or phrases).

## Filling a gap

BLITCHLEY-BASED Remtek Micro Electronics has introduced a stand-alone expandable single board computer for use as an industrial control system. For under £500, the 16MC20, which is based on Texas Instruments' 16-bit 9981 microprocessor, fills a gap between programmable logic controllers and microcomputers.

## 500 accessories

ABOUT 500 different accessories for microcomputers and micros are now available from the UK centre set up at Runcorn, Cheshire, by the US firm Intmac which claims to be the largest independent distributor of its kind in the world. A catalogue can be obtained by phoning Runcorn (092 85) 67551.

## Prices down

PRICES of Intel's 8748 single chip 8-bit microcomputer have been reduced by up to 30%. In 100-piece quantities the high temperature 6MHz device, the D8748, costs \$33 and the lower temperature D8748-6 costs \$41.50. The 3.6MHz device now costs \$31.50.

# "I need money to make my ideas work -but who'll listen to just ideas?"

Like most people running a business, you'll reach a time when you want to expand. You'll need to borrow money. But how do you get your proposal down on paper to convince a bank manager?

Lloyds Bank knows it can be difficult. So we'll help you get the case together. One of our Finance Series handbooks "Making a small business bigger" has a section giving step-by-step guidance on how to present your case convincingly.

## Our loans can help

We offer two types of loan specially geared to helping new businesses grow: Asset Loans of £5,000 to £25,000 and Enterprise Loans of £25,000 to £250,000 or more.

Come in and pick up the booklets — or talk to us about your ideas. We'll try to help.

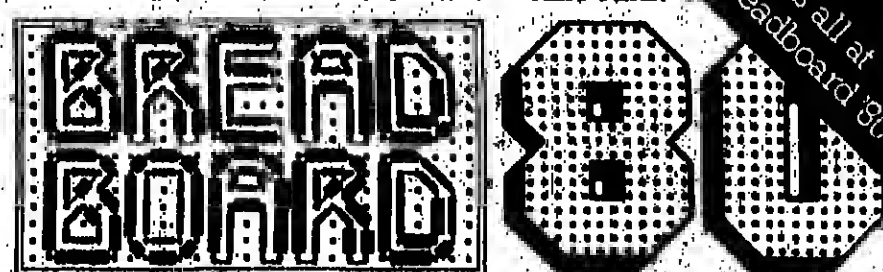


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November 26-30 1980

This is the exhibition for the electronics enthusiast. From November 26-30 there is only one place in the universe for the electronics enthusiast to be — Breadboard 80 at the Royal Horticultural Hall in London. The majority of leading companies will be exhibiting, including all the top monthly magazines in the field. There will be demonstrations on most stands and many feature special offers that are EXCLUSIVE to Breadboard!

All aspects of this fascinating field are catered for, from CB to home computing, so whether you want to buy a soldering iron or a synthesiser, or just keep up to date with your hobby — don't miss Breadboard 80.

It's all at Breadboard 80







## PEOPLE and EVENTS

## Project leader wins IETE women's award

PROJECT leader Penella Hume has been named IETE Technical Engineer of the Year. She receives an inscribed rose bowl and £250.

Iganlan-born Hume, who is 23, began her career as a trainee test engineer in 1974 with Cambridge Scientific Instruments. During her four years with the company she was promoted to service workshop engineer and then junior design engineer. In 1978 she joined Kent Industrial Measurements as development engineer, and in September last year was promoted to project leader.

She has an IINE in electrical and electronic engineering and is in the third year of her BSc in electronics. Her age was 23-year-old Sally.

Maurice Scott has been appointed financial director of Sigma Electronics. He was formerly financial controller at K&N-Zonal and K&G Instruments.

Roger Mooney has joined ATS Telemetry in Haywards Heath as chief engineer. His previous experience has included positions with Monolog Systems and Computing Techniques.

David Low is the new managing director of ACT Microsoft. He was formerly European manager of the company's microcomputer division.

Kevla Pracha has been appointed manager of the new Technical Support Division of Computermill. Colin Winsor has been named UK sales manager at the company's Sales and Marketing Division.

William Tollenger has been appointed director of systems engineering at Hitech in New Hampshire, US. He previously worked for Hendrix Electronics, where he supervised the engineering and development of the word processing product area.



Tandem Computers has formed a regional organisation headed by former UK country manager Jack Chapman. The past of managing director in the UK has been filled by John Louth (above). Louth has spent the last two years with the company in Chicago and at the Cupertino, California headquarters. He previously worked for Burroughs Corp in various head office management positions. Head office of Tandem's new region is at Paul House, Middlesex, but independent offices will be acquired during the next few months.

Dunne Johnston, former real estate manager of Burroughs Machines, has taken on a similar post with the company's Europe/Africa Division. Before joining Burroughs, he worked in local and national government and with several large companies including the Grand Metropolitan Hotels group. His successor is Chris Gilbert, formerly Burroughs' assistant real estate manager.

## RCA expands

FIVE systems engineers have been appointed at RCA Systems Services in Guildborough.

Ian McKee worked for five years with the Royal Navy, based at HMS Collingwood, where he first taught mathematics and computing and later became involved in a computer purchase to deal with administration and training prediction. Colin Bagg joins from Wayfaring. Barry Grieves previously worked for Ferranti Computing Systems in South Wales, designing computer memories for military systems. Andy Coldridge joins from Marconi where he was a digital design engineer and later microprocessor designer. Paul Massey previously worked for Radius.

Geoff Lewis, who established the Edinburgh division of Mills Associates, has been appointed software administration manager of Mills Associates in Monmouth. Replacing Lewis at Edinburgh is Jack White, who has been promoted from operations manager.

## Chairman of GR International

JACK McNally MBE has been appointed chairman of GR International Electronics, Perth. His career includes 22 years with Beckman Instruments, 13 of which were taken up as managing director, and the last four as chairman of the three Beckman companies.

He is also chairman of Beckman's operations in France and Italy.

He is currently chairman of the CBI (London) Regional Development and European Committees, and was recently elected a Fellow of the Royal Society of Arts.

McNally is a member of the CBI (London) Regional Development and European Committees, and was recently elected a Fellow of the Royal Society of Arts.

## Top job at Prime UK

AS PART of Prime Computer's UK expansion, Neil Macfarlane has been appointed managing director. He joined Prime with over 18 years' experience in the computer industry.

Between 1965 and 1974 he held various posts with Honeywell Information Systems, starting as a systems representative in Chicago and eventually becoming manager of large systems marketing in the UK. He left Honeywell to work as regional manager for central government sales at ICL in August 1974, staying three years with the company.

His most recent appointments have been with Computer Automation, where for over two years he was responsible for sales and support operations throughout Europe, and with Sperry Univac (Australia) where he was responsible for sales and support operations throughout New South Wales.

Ken Taskard has joined Data Logic's Communications Products Division as sales executive. He previously worked for Nottel Communications, also as sales manager.

Ian Locke has been appointed principal liaison engineer with Ferranti Computer Systems in Sydney, Australia. He previously held several posts within the Australian Department of Defence at Canberra.

Brian Walker has joined United Leasing Ltd as UK sales manager. He was formerly with the Inland Revenue.

Keith Newman has joined the technical support department of Computer Machinery Systems' North West Home Counties branch. He was previously with Leibherr Great Britain.

Harold Scott has been named regional marketing representative for TRS-80 Videotek at Radio Shack, a division of Tandy Corp.



Barracough Senior consultant

PERCY BARRACOUGH has been appointed senior consultant at Systems Consultants Ltd (SCL). The company has made two other new appointments: Bob Hale joins as system and programming development manager, and David Robertson becomes sales systems analyst. All have had over 10 years' experience in the computer industry.



Baratt Office of the Year entries

ANYONE interested in entering the Office of the Year 1981 Awards should contact the Institute of Administrative Management, 205 High Street, Bournemouth, Dorset. Tel: 01-458 0171.

Art Lambert has been appointed vice-president and general manager of Computer Cable products division of Vertex Electronics in Farmingdale, New York. He has 18 years' experience in this field.

Tony Rand has been appointed general manager and financial controller of Sinclair Research of Cambridge. He was previously assistant to the managing director of Tidland Management.

Sinclair's new production controller is Dave Chatte, formerly with the company's Radionics division at St Ives.

## COURSES

## Micros for management

A WORKSHOP on the use of microcomputers for management information is being held at The Churchill, Portman Square, London, W1H 0AJ from November 26-28. Organized by RB Conference, the workshop has been designed to give participants practical experience with different mini-microcomputers, programmes to handle management information based on probabilities. Those expected to find the course useful are chief executives, and directors/managers concerned with marketing, production, purchasing, R and D and personnel. The fee is £285 + VAT, and includes two nights' accommodation. For further information telephone the organizers on 01-946 6062.

## Coping with new technology

A SEMINAR for senior executives, aiming to demonstrate how to manage the change brought about by new technologies will be held in Spain from December 4-7. It is organized by CMS, and will examine the role of the senior executive as well as highlighting management techniques to show how future strategies can be developed. The seminar will be held at the Hotel de la Gaviola, S'Agust, Costa Brava, near CMS, Lugares House, 110 Fleet Street, London EC4A. Tel: 01-583 6891.

## DIARY

NOVEMBER 25 Meeting: IBM Minicomputers, BCS Microprocessor Group, BCS headquarters, 2.00.  
Meeting: Word Processing and Office Automation, The US: BCS Word Processing and Office Automation Group, Prudential Assurance, Holborn, London, EC1, 5.30.  
Meeting: Networks and Fund Transfer, BCS Data Communications Group, BCS headquarters, 6.00.  
NOVEMBER 26 Meeting: Microcomputers in health care, BCS Medical Group, Middlesex Hospital, London. Apply to Hospital Physicians Association, 47, Belgrave Square, London, SW1.  
Meeting: Management game, IDPM Sheffield branch, Cornsare Offices, Sheffield, 6.30pm.  
NOVEMBER 26-27 Meeting: State of the Art Review, Infotech, Connaught Rooms, London, 9.00am, Tel: (0628) 35031.  
NOVEMBER 27 Meeting: Word processing, IDPM Central London branch, Mission Room, National Liberal Club, Whitehall Place, London, SW1, 4.00pm.  
Meeting: The Design of Distributed Microprocessor Systems, IEE Computing and Control Division, IEE, Savoy Place, London WC2R 0BL.  
DECEMBER 1 Meeting: Computer Arts Society,

## Liveware File

HOW MUCH TAX REFUND... WILL I GET FOR BEING MADE REDUNDANT?

SORRY, I CAN'T HELP YOU... UNTIL OUR PAYE SYSTEM IS UP AND RUNNING!

The Inland Revenue plans to install four or five single processor mainframes at each of the 12 proposed regional centres. Each will support about 500 terminals and ICL's capability to handle this volume has been carefully investigated by the Inland Revenue.

coinciding of an outside plate embedded with cooling water channels and spring loaded metal heat sinks plating the plate with each chip.

The space between the plate and substrate is filled with helium to help cooling further and to protect the design against chemical contamination.

Writing is reduced further by the boards on which the Thermal Conduction Modules are mounted.

IBM has announced no new software with the 3081.

## ICL AND IBM OFFER PRICE/PERFORMANCE BOOST WITH NEW MACHINES

## 2966 for PAYE processing

ICL deputy managing director Peter Ellis has confirmed that the company will be offering its new 2966 mainframe in the Inland Revenue as the machine for handling online PAYE processing.

After talking to ICL for more than two years the Inland Revenue has now formally issued the company with an operation requirement following the government's decision to invoke the single tender procurement policy before it expires at the end of the year.

Ellis said the contract would be worth between £30 and £40 million to ICL, but commented that it was more important to the company in terms of maintaining its credibility than the actual money involved.

The contract to supply the 20,000 terminals required for the PAYE system is not subject to the single tender policy and will be open to bids from any potential supplier, whether UK-based or foreign. But the Inland Revenue feels confident that one or more UK-based firms will be able to satisfy its requirements, the main one being compactness.

The total terminal business will be worth about £30 million and

the 1980 to "migrate" up to the larger 2980 and continue to run their old software on the new hardware.

This meant that the daily workload could be run as usual, with VMEB and VMEK development undertaken at off-peak periods.

A microprogrammed software harness, Concurrent Machine Environment, now links the larger VME systems for virtual operation to the DME Direct Machine Environment so that DME and VME can be run in parallel.

DME itself was introduced three years ago to allow users of the 1900 to "migrate" up to the larger 2980 and continue to run their old software on the new hardware.

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## CME provides 'virtual' link for parallel operation of systems

A CLUTCH of new operating systems announcements accompanied ICL's launch of the 2955 and 2966 last week. As predicted by Computer Weekly earlier this year (CW April 17), the "time slicing" technique is being used to allow 2900s to run VME and DME simultaneously.

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## Redistribution

Now CME, also developed through microprogramming, allows the user to run DME and VME workloads together. According to ICL, applications can be developed in the same shift, and the user can control machine resources allocated to each regime.

The microcode is said to be modular, so that it can be tailored at load-time to take account of individual needs. As the workload shifts towards VME, resources can be redistributed by partitioning store, allocating peripherals, power, and communicating devices between the two regimes.

The asterisks in fig. 1 indicate which version of CME will apply in various combinations of hardware and operating system.

For example George 3 users (who usually show such devotion to the OS that it is hard to imagine VME getting a warm welcome in any circumstances) will be able to link

with VMEB or the new entry level VMEB-E on a 2966 using CME13.

Programs run under VME can read and write data from 1900 DME files through the Adram facility; this entails what is promised to be "a minor change" to ICL when a VME program accessing 2900 data follows a DME record access.

The entire range of applications such as DMS and DMS, TPMS, and screen editors, are available with CME but CME itself will not be available across the entire machine range.

Users of 2946, 2950, 2955, 2956 and 2966 will have the option open to them, but 2960 users have been left out in the cold. ICL gives an example of pricing for the system at £330 per month for CME on a 2966.

Clare Gooding writes: Announcing CME allows ICL to keep

another release of ICL's operating system VMEK, KSV 18, follows quick upon the heels of KSV17, which completed field trials last month ago.

The revamped K will support the newly-announced 2986 and is said to incorporate new features while building on facilities available in the current version, considerably referred to by the catchy title VMEKSV 17.50.

The KSV18 version provides support for the Information Processing Architecture features such as Remote Session Access, Distributed Message Router, Distributed Application Facility and File Transfer Facility, as well as connection to the X25 packet switching standard.

KSV18 also supports CME2 and Adram 1800 and the Modular Disc Storage System. ICL promises "exceptionally high throughput."

ICL has also introduced a new version of the large system OS VMEB. Called VMEB-E, it is an entry level system aimed at new users to provide straightforward implementation, and a simplified growth path from medium to large 2900 systems, leading eventually to network configurations.

It is built on a modular structure so that features such as transaction processing, performance measurement and accounting can be built into the basic system while normal operation continues. It is available on single and dual 2900 systems: 2858, 2980, 2888, 2970, 2872, 2976, 2980 and 2982.

ICL is obviously firmly committed to IPA, and VMEB-E is another lure to win customers for data access mechanisms supported by VME which provide the foundation for future developments.

## Bridge

In fact, CME is a bridge which allows users to perpetuate sustained batch systems which originated with DME: a concept which still supports many customers who have invested a great deal in it.

It's good that ICL is aware of its customers' present needs as well as future ones, but the danger of providing such a bridge is that some will dawdle on it rather than crossing the river once and for all.

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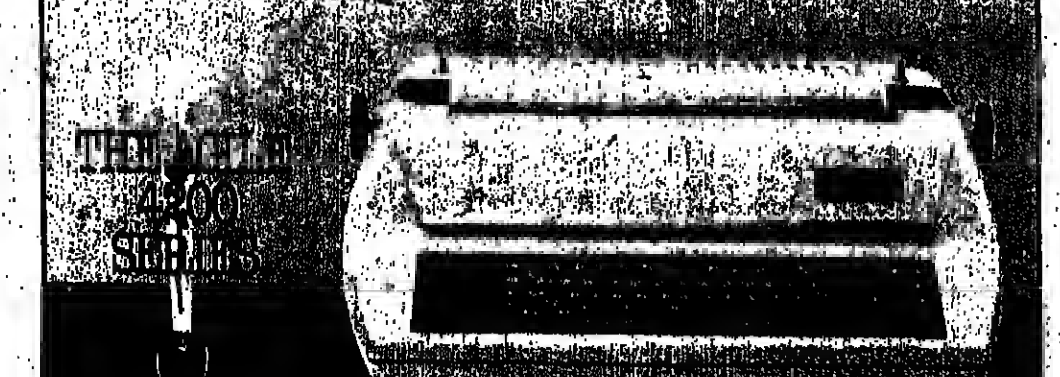
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## THE ONLY DATA TERMINAL THAT RUNS WITH HEWLETT PACKARD 3000 SERIES FAST



## ADD THE AGILE LC36 AND YOU CAN RUN IT WITH BURROUGHS &amp; IBM SNA/SDLC

The new AGILE 4800 Series Data Terminal is the ONLY data terminal that works with Hewlett-Packard's 3000 Series. It is 11 or 35 can run at 1200 baud and on full speed with X-on and X-off receive line protocol controlling transmission from the host device to prevent the terminal buffer overflowing.

And there's more. Add the AGILE LC36, a single cooling, programmable communications interface, and you have the only interface that allows any and every Burroughs user, B-1800 to B-7700, to use the letter-quality AGILE printer. Then, if that's not enough for you, the LC36 protocols give you compatibility with IBM SNA/SDLC.

Other AGILE 4800 Series features include:

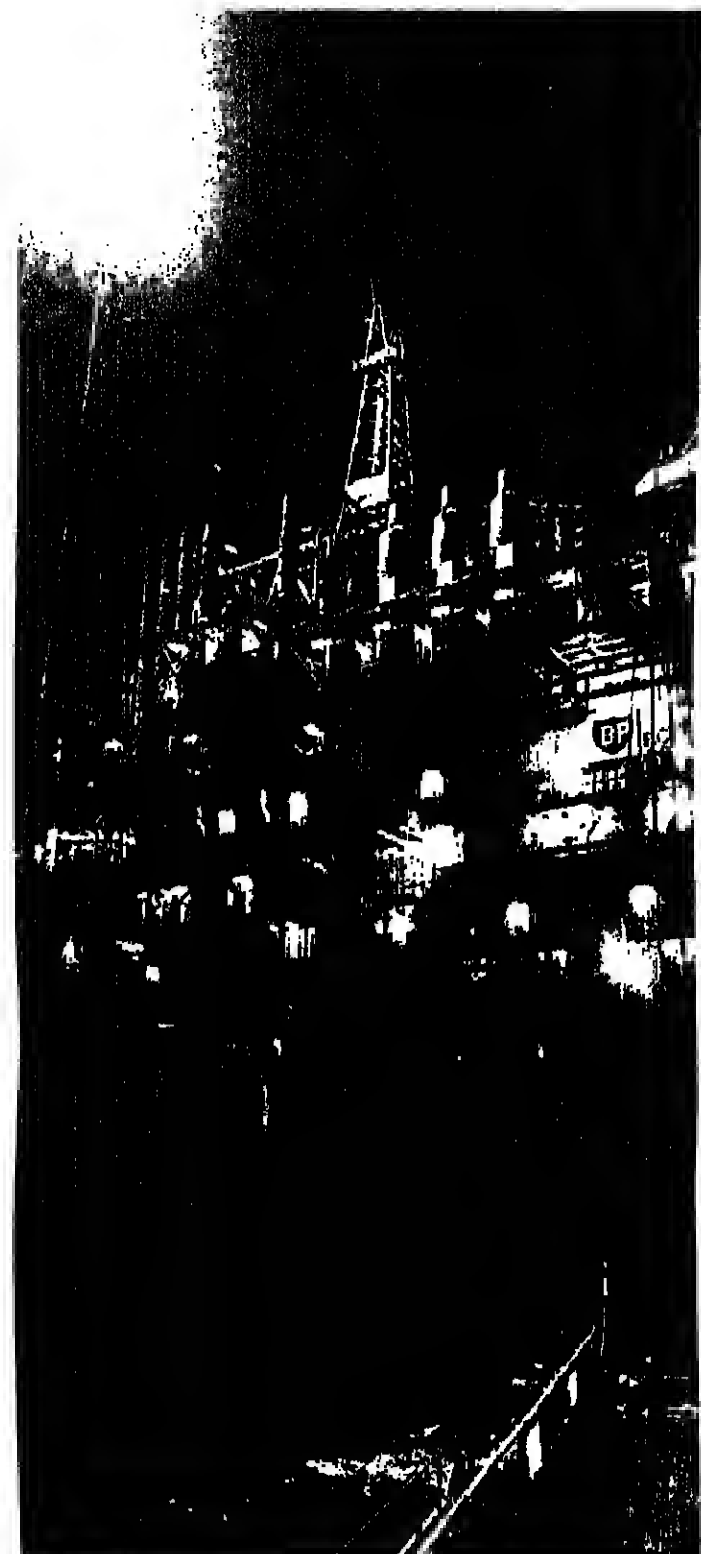
- Letter quality display with print-out at 60 cps
- 900 - 1800 baud
- Over 120 memory and firmware options
- Superplot graphics: 8 - 60 lines faster than other terminals
- Microprocessor controlled word processing options
- Printing program and editing and justification
- Full after sales service
- AND MANY, MANY MORE!

The AGILE Series from 1980 Data Sales. Can you afford not to know more about it?

1980 Data Sales



# How DP helped in the switch from buyer to seller



Night view of production platform FC, Highland One, in BP's Forties oilfield in the North Sea.

IN the past 18 months, BP has had to cope with the effects of the Iranian crisis which has deprived the company of 40% of its crude oil supplies; nationalisation of its oil interests in Nigeria with hardly a warning; and a 100% increase in the cost of crude oil supplies from Opec countries in a period which also saw Opec backtracking its prices, further complicating the financial situation.

Coping with such situations is not just a case of juggling with numbers. Changes in the prices and availability of crude oil not only affect what is bought and sold. There is also a significant impact on the processing volumes of refineries, both those producing petrol and oil products, and those making chemicals and all of the other derivative products; bulk shipping movements of crude oil, petrol, etc. are affected; strategies are substantially altered and a multitude of financial decisions have to be made.

Yet despite all this, BP's gross revenue increased last year by £5,200 million and its net income by almost £1,200 million. Effective management decision-making obviously forms an important part of the ability to control finance in such conditions, but efficient computer systems also play an important part.

## Vast

Computer systems used within BP for accounting functions are not all run-of-the-mill systems. The general ledger, associated accounting and management information systems for BP Trading alone are so vast and complex that they involve some 30 programmers and analysts in maintenance and constant development.

BP Trading's accounting systems also involve computer generated input from many other systems throughout the world.

BP Chemicals, for example, have seven principal factories in the UK manufacturing chemicals and plastics such as PVC and polystyrene. The BP Chemicals owned company BXL Plastics (originally Bakelite Xylonite) has a further nine factories in Britain producing polythene and a wide range of bottles, synthetic paper etc. BP Chemicals also owns a number of other manufacturing companies.

BP Chemicals' UK data processing operations have three ICL 2900 computer centres, each of which forms part of an order entry and invoicing network. A four-megabyte 2972 processor at Baglan Bay in Wales forms the hub of the network, and the other centres include a 2946 at Barry in South Wales, linked via an RJE into the 2972, and a 2956 in Hull is also about to be linked to the 2972. A major function of the network is transmission of bought ledger, sales, bank or cash information, into the 2972 installation.

## Tapes

The network is in the final stages of completion and involves a total of 11 sales, distribution and manufacturing sites throughout the UK. Seven of these are currently online, with a further four to go online by the end of this year. An average of 25,000 entries a month are handled for each site via ICL 7502s linked to the 2972 centre.

Three times a day the discs are accessed for orders and the data consolidated against the original input at each terminal. This up-

dates the order file and produces order confirmations and work instructions with the necessary documentation printed remotely back at each site. Customer despatch data, input via the 7502s online to the central accounting systems, triggers the invoicing cycle, invoices being despatched from the Baglan Bay Centre, although soon they will be printed online to each site.

Direct interfaces are also being developed into sales ledgers, statistics, and VAT returns. Transactions from other source systems and interactions with secondary systems such as budgeting, costing etc. are also interfaced into the main ledger systems at BP Chemicals. Tapes are produced for BP Trading's corporate VAT system.

BXL Plastics also has its own network with terminals for its nine UK factories linked into an IBM 4341, and connected to an IBM 3031 centre in Antwerp. This is further linked by RJE to the major European centres where BP Chemicals operates. Consolidation of accounts is carried out at each stage, so that Antwerp, for example, produces accounts for continental associates in a format which, together with consolidated accounts data from other parts of the world, is finally consolidated at Baglan Bay to produce a trial balance, profit and loss account and interim balance sheet every month, for all of BP Chemicals' trading operations.

Operating throughout the UK, BP Oil's function is the refining of oil and the manufacture and distribution of various oil-related products, such as petrol and lubri-

cants, via a combination of its own depots, marketing distributors, etc.

One of BP Oil's many DP-based functions is a distributed clustered network used by 38 depots, at which BP Oil receives sales orders and from which oil, petrol and related products are distributed. The network consists of 14 clusters of Datapoint 6600 minis at main depots, each linked to two or three other depots with Datapoint 2200 terminals. The 14 clusters are in turn linked to Univac 1100 mainframes at BP Oil's main computer and accounting centre.

## Vetted

Operators at the depots deal with telephoned customer orders, keying in a mnemonic on the Datapoint to identify the caller. Appropriate quantities of the various grades of fuel entered as an order are vetted by the system to ensure that the order is correct against the typical ordering pattern of that customer in the past. The system is subsequently updated with customer delivery confirmation against delivery tickets.

This system is also used to aggregate oil stocks at each depot against regular readings taken from the tanks, and will soon integrate with a stock control and tracking system of oil product movement throughout Britain.

BP Oil also has some 50 marketing distributors in the UK. These are independent companies responsible for the delivery of smaller quantities of oil products to households, factories, farms etc. Most distributors have Ventek

**SINCE last year, national movements and the rise in Opec prices have meant that BP has ceased to be a major seller of crude oil and has been forced to buy in order to supply its customers. Not only the processing turnover of refineries was affected; strategies had to be rethought, and a lot of financial decision-making had to be done.**

BP management was obviously equal to the challenge, since the company managed to increase its gross revenue by £5,200 million. But to do this, it needed effective support from its computer accounting systems. The third in our four-part series describes these financial systems.

Datapoint 1500 terminals for data capture and send in floppy discs to BP Oil for the provision of an accounting service, including the production of customer statements of account. The development of a new enhanced system giving the marketing distributors order capture, invoice production and local online interrogation facilities, etc. is now well under way and due to be piloted shortly.

● Turn to page 15



The central communications console in BP Trading's computer services department, which receives data from hundreds of BP companies world-wide.

# Controlling finances

**BP** From page 14

Behind such moves, designed to improve cash flow, are also systems such as those for BP Oil's systems staff which have their own VDUs to update customer payments in real time. Such systems are essential as BP Oil is producing 4,000-5,000 invoices a day involving £11-12 million.

Like BP Chemicals, BP Oil also produces computer formatted consolidated group accounts, which form part of the accounting information input required to produce the consolidated group accounts for BP overall. Such accounting data from the hundreds of BP companies world-wide is received by BP Trading's own central computer department, either input by telex as a direct link into a PDP-11/34 used as a reception system, or received as a tape containing accounts data.

In addition, input is required from systems run by BP Trading for its own world-wide operations. Therefore, many accounting related systems as well as the general ledgers and integrated MIS systems are run on the three Univac 1100 mainframes operated by BP Trading's computer services department.

Typical of these is an international marketing data capture and processing system for aviation fuel and a similar system for marine fuel. Supply of aviation fuel and supply of marine fuel are international business operations controlled and invoiced by BP Trading, and systems were therefore designed to provide rapid validation and transmission of delivery data from remote sites around the world to BP Trading's central computer facility.

At the fifty or so large marketing sites at major airports, docks, etc. BP has installed ICL 1500 systems to collect and transmit the information on deliveries. The data is transmitted daily by remote batch communications to the PDP-11 reception system (in the case of smaller sites, by telex into the PDP-11).

Once a day, data from the PDP-11 is passed to the Univac processors for automatic invoicing. While, at the moment, these invoices are mailed by BP Trading, an investigation is currently taking place into means by which telex invoices may be generated and sent out automatically via the PDP-11.

As well as automatic pricing systems, payrolls run on a database and so on, there are a number of transaction accounting systems, run by BP Trading, handling such items as foreign payments. There is also a dedicated online entry system for petty cash, travelling, expenditure, based on an ICL 2900.

## Polled

The accounting key in BP Trading is the general ledger system, which handles 15,000 update records of the main trading ledgers a day. All input (from other systems) fed into the ledger system is represented in a control file by a list or series of slots containing a file name and checked against a master file reference system. All the files are constantly polled every day on an exception basis, for any missing information that has not yet been accessed.

Validation is carried out automatically (the validation program takes the 64K words heavily overlaid to a total of 200K). Processed and accepted files are allocated in batches on a company by company, and currency by currency basis. Input is also established by date references so that at the end of each day a complete trial balance can be run with the total of all ledgers by company and by currency, which is expected always to be a zero balance.

Of approximately 3,000,000 records that are input to the ledger systems each year, 90% are computer created by other systems, while the remaining 10% will soon be input at transaction level via the ICL 2903, thus putting validation and data entry into the hands of the user.

To assist user departments, the ledger systems include a bespoke report generator using a large data dictionary. An auto scheduler, not just for accounts but for all user departments including computer operations themselves (so that they can specify and schedule work entering the Univac), enables every item within the dictionary to be defined as either an output or an input event.

Supposing, for example, that accounts decides that marine invoicing must be closed on one date and aviation invoicing on another. The system enables all events to be linked in a chain, so that one event might trigger off 30 or 40 events, which in turn can trigger off 200-300 - based on the original data defined by accounts.

FIMS is BP Trading's financial management information system designed to provide actual income statements for each accounting quarter. It is being developed to include oil estimates which will provide financial forecasts and enable comparisons with actuals.

## Investments

The main computer functions of the system are data collection; the control of data between FIMS and the general ledger system; a reporting facility; the maintenance of the FIMS database; the selection of data and its manipulation for reports; and the production of management reports.

BP Trading's finance department's activities involve investment in the inter-bank market in London, and foreign exchange deals in the London market - it handles almost as much foreign exchange, investment and cash as some of the major clearing-banks. The department has its own 10,000 based system to aid control of all day-to-day cash handling, and this acts as a treasury for all BP companies throughout the UK who call up their cash requirements or make available cash surpluses each day.

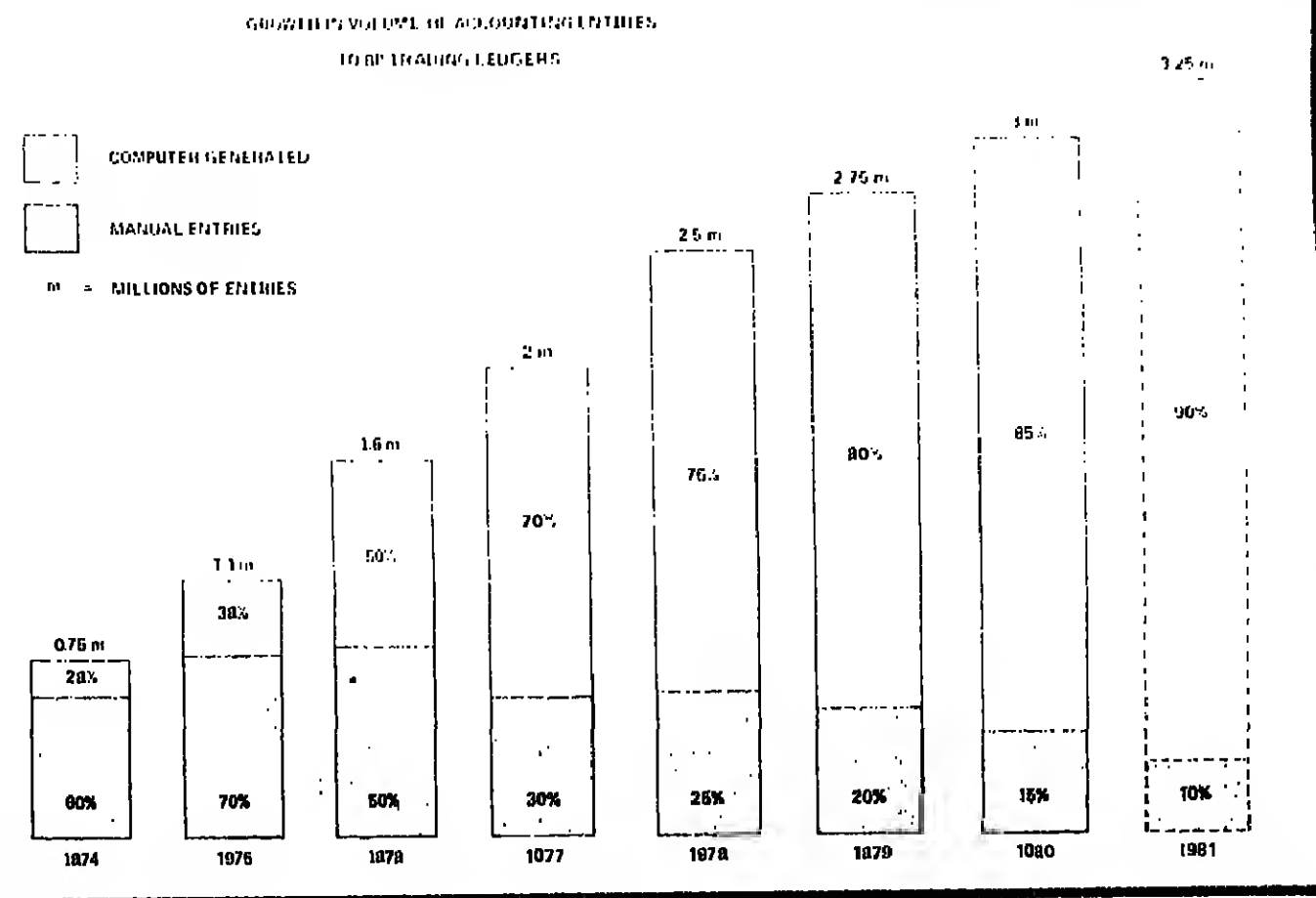
At a given time the cash ranges substantially, although monthly turnover averages the equivalent of £1,250,000,000 with holdings in terms of bank investments, local authority loans or short-term investments running at times over the £1,000 million level. Such sums can justify a dedicated system which was specified and developed as an online interactive system. Three areas are handled by the system; foreign exchange, investments and borrowings.

The financial director of BP Trading, Q. M. Morris, also has a VDU linked into the system, so that at any time he can access the system to determine the group's cash and banking situation.

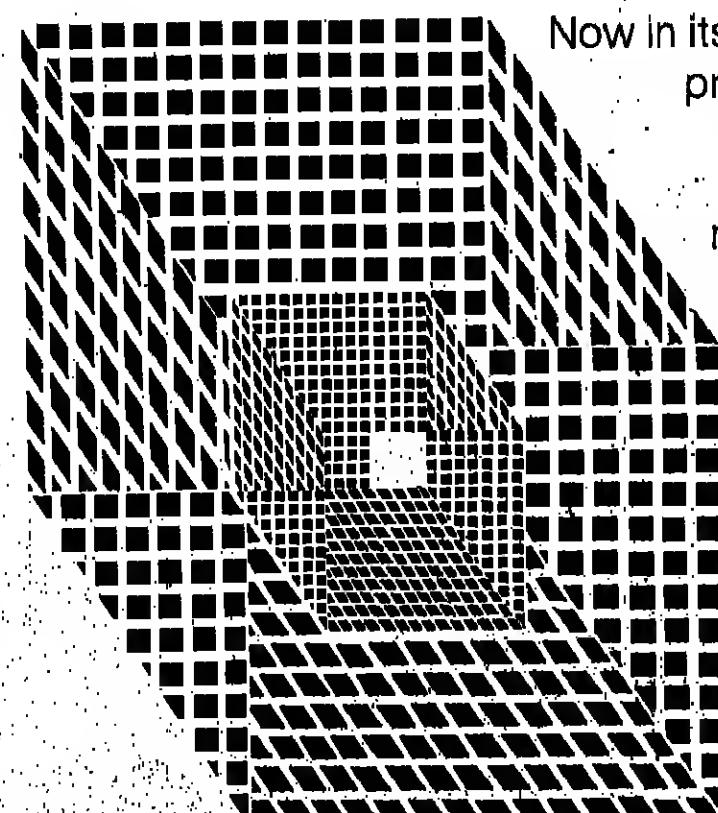
The system is used to present an overall picture of the cash flow of BP Trading and other subsidiaries, at the same time enabling individual aspects of cash to be looked at in detail. At the moment, input is manual, based on output information generated by other computer and manual systems.

A probable future development will be to link the system online into other financial computing systems in the UK. Payments that the department makes may also change, for BP is considering using the VDUs to input data into its bankers' computer systems, which would enable it to make payments using the bank's computer facilities. Such moves indicate that soon organisations such as BP may also be linked via their banks directly into systems such as Swift for international foreign exchange transactions.

Next week, the final article in this series will deal with original developments by BP on the computing scene.



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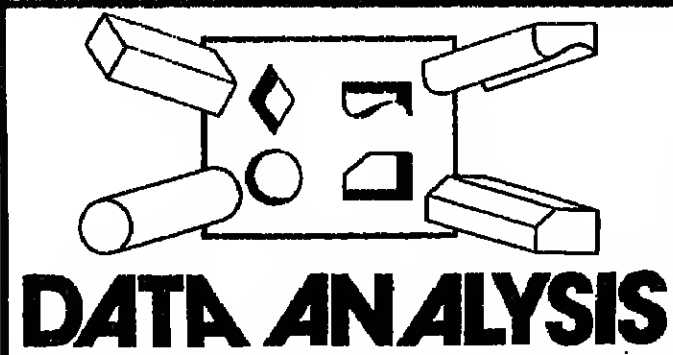
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## DATA ANALYSIS

by Rosemary Rock-Evans  
Section I — Part 8  
of our series describing a  
systems development methodology

THIS series has now introduced the two main phases of data analysis — functional analysis and entity analysis. In this part, a new concept, that of attribute types, will be described.

Attribute types are determined during both entity analysis and functional analysis; they are also used by, and have a direct consequence upon, both of these stages. In the next article it will be seen, for instance, how the study of some attribute types can result in

# Attribute types — properties of the entity type

changes to the entity model. Attribute types form the basis for the data items/fields which will be used in the database and programs.

A simple example of attributes and attribute types is given in Figure 1. Each attribute type in the example is describing some quality or property of the entity type.

1. Primary, or Basic. The basic facts which must be collected in order to carry out the functions of the business. They cannot be deduced or calculated from other attributes and must be collected during some business activity.

For example, the function "Patient registers with Hospital" may result in the sex of the patient and date of birth of the patient being collected. "Death of Patient" will result in the date of death being available.

Figure 2 gives examples of some basic attribute types which might be expected in the hospital example we have been using. 2. Secondary, or derived. These are generated from other attributes, as a result of the functions of the business. Note that we are not concerned at this stage about whether the attribute types have any permanence, ie, these attribute types may be stored on the database or they may just form the working storage of a program. The interest is in their existence and definition.

Some examples of derived attributes are given in Figure 3. The number of days the patient has been in hospital, for example, may be calculated by subtracting from the current date or date the patient was discharged, the date the person was admitted to the hospital. It can be seen that the primary attribute types, as they are not influenced by the functions of the business, can often be determined during entity analysis, even though their purpose will not be precisely defined. The discovery of many of the secondary attribute types, however, will be dependent upon the results of functional

analysis. Within the primary attribute types, a further type of attribute exists which is of especial importance to analysis and systems design — that of the "key" or entity identifier. A key is the means by which an entity is uniquely identified; by which each entity of a given type can be distinguished from all others of that type. A key is really a design consideration, in that it is the means by which data about the entity can be retrieved. An identifier is inherent in the meaning of the entity. The analyst should not define an entity type if it is not possible uniquely to distinguish its entity occurrences.

### Identifiers

The following methods can be used to identify entities. 1. Attributes of the entity. The value(s) of an attribute type or types which describe the entity type may be used to identify an entity. If one attribute type is used, the identifier is termed "simple". If more than one attribute type is used it is termed "composite". An example is given in Figure 4.

2. Attributes identifying other entity types. The identifiers of entities of one or more types may be used to identify another entity. Identifiers of this category are called "foreign". If the identifier of only one entity is used to identify another entity then the latter key must be made unique by using further attributes of its own. It is possible, however, to identify an entity uniquely, using only

the attributes of other entities. Examples of these two cases are given in Figure 5.

Often system designers may already have invented keys for the entity type under study, but if it is the job of the analyst to choose an identifier, the one major rule which must be followed, whichever type of key is chosen, is that the values of the attribute types chosen must not vary over time. If this rule is not followed the entity will not be identified consistently over time, and chaos can result.

In general, foreign attributes are used as identifiers where the entity type only exists because other entity types exist: an operation cannot exist without a patient, a clinic session cannot exist without a clinic. In effect it is the operation's membership of a specific "Patient is Operated on" relationship, which is used in part to identify the operation. It is not valid to identify an entity type with the identifier of another entity type if the one is not dependent for its existence on the other (ie if the relationship is optional) because, if one does not exist, the other cannot be identified. For instance, if patients were given an identifier which depended on the first appointment they had had, it would not be possible to refer to a patient who had no appointment scheduled.

Note that where the existence of an entity type is totally dependent on the existence of other entity types — for instance, a clinic session cannot exist without the clinic

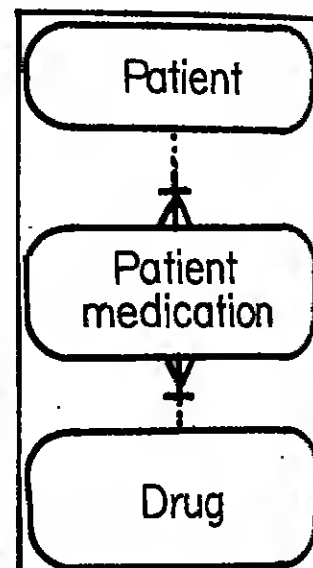


Figure 6. Intersection entity type.

— this can be represented on the entity model by the use of a stroke across the relationship line between the two or more entity types, see Figure 6. Note also that although the entity type is dependent for its existence on the existence of a patient, and a drug, the attribute types used to identify the patient medication need not necessarily be the identifier of each of these entity types. An entity type of this kind known as an "intersection" entity type.

### Determination of attribute types

The determination of attribute types uses the rules for data analysis which state the restrictions within which analysis must take place (the parallel with language is shown in brackets):

1. Each notion in the environment must be classified as either an entity (noun or noun phrase) or an attribute of one entity (adjective or adverbial phrase) or a relationship between entities (verb or verb phrase); each element should be classified in only one way.
2. Only entities have attributes (only nouns have adjectives).
3. Only entities have relationships (verbs can only describe the connection between nouns).
4. One further rule may help in the determination of attributes: an entity can have only one value associated with each attribute type, ie if Jim Brown was an entity, within the Patient entity type, it would be invalid to have an attribute type of Height with two values 5ft 6in and 6ft 0in.

The contents of clerical files, forms, letters and reports, the results of functional analysis and the results of decision analysis will all reveal relevant attribute types. All the basic rules for determining attribute types will be given in Part 9, since it is best to discuss the determination of attribute types while also discussing the problems which can result.

The definition of attribute types and the two types, primary or basic, and secondary or derived, have been described, and the use of attributes to identify entities. Part 9 will cover the determination of attribute types and some of the problems which result.

The Data Analysis methodology was developed at CACI by Jim Palmer.

Entity type	Identifier	type
Patient	National Health Service Simple no of patient	Simple
Doctor	Hospital staff no	Simple
Clinic	Clinic no and clinic district code	Composite
Operating theatre	Room no, hospital wing no and floor no	Composite

Figure 4. Identifiers.

Entity type	Attribute types	Owner entity type
Appointment	NHS no of patient Date of appointment Appointment number (within date and NHS no)	Patient
Clinic session	Clinic code Session number within clinic code	Clinic
Team member	Team number Doctor/nurse no	Team Doctor or nurse

Figure 5. Keys.

Thorn TV Rentals has more than three million customers. When longer and longer postal delays caused overdue reminders to cross with payments, 85% of its correspondence was composed of accounting queries. An alternative accounting system was sought, and telecoms was the obvious answer. Here LAURA TATHAM describes the transition to the new regime.

## Tightening up on rental accounting

A TELECOMS network that will improve the servicing of customer accounts and ensure more effective control of the monies paid each day into its showrooms has been brought into operation by Thorn TV Rentals, one of the UK's largest groups renting domestic televisions, video sets and videorecorders.

Thorn TV Rentals is the parent company and central accounting unit for Radio Rentals (1.75 million customers), DER (1 million) and Multivideo (350,000). The group has more than 1,000 showrooms throughout the country, where customers can see the televisions available for rent, sign contracts and buy accessories such as video tapes. They can also pay their weekly, monthly or quarterly rentals.

Under the previous regime, details of such payments were mailed from the showrooms to each of 13 area accounts offices, where the data was prepared for onward transmission to Swindon. It was because of long postal delays that it was decided to develop the new system.

"The old system worked satisfactorily on the whole," says director Bob Rumsey, "but when as much as five days passed before data reached us, we began to get very worried."

### Irritated

"Our ICL mainframe issues reminders to customers whose payments are overdue, and with the postal snarl-up more and more of these reminders went to people who had already paid — sometimes several days earlier. Understandably, many got very irritated. In fact, at that time, about 85% of all the correspondence we handled was in connection with queries on accounts."

"So we began to look for an alternative that would solve the problem once and for all. Aside from improving our service to customers, we wanted a system that could cope with new 'applications'."

Telecommunications was the obvious answer. The big question was what shape the new system should take.

There was, Rumsey recalls, no-one to turn to for first-hand advice, since no organisation had yet tackled a problem of this scale and complexity. So Thorn carried out its own study.

The resulting system is notable, not only for its novelty, efficiency and cost-effectiveness, but also for remarkably rapid implementation. Because Thorn's broad criterion was excellence in each of several areas — expertise, its system is "flexible", involving the equipment of several suppliers.

Heart of the network is a Univac V77/600 minicomputer at Swindon, which is linked by dedicated 4,800-bps lines to 13 regional accounting centres, each of which has a V77/200 mini.

Thorn selected the Univac V77 minis because we were impressed with this manufacturer's expertise in telecommunications and with the performance of these minis," says Rumsey. "It was obviously important to have the right capacity and complete reliability when we were developing such an extensive network."

Univac's ability to system design also ensured that "all the various components in this tightly complex network linked smoothly together."

The regional centres each collect data on disc from about 100 showrooms which are equipped with point-of-sale terminals, purpose designed by Data Terminal Systems. "DTS was one of the few companies that were prepared to enter for our special requirements at a competitive price," says Rumsey.

### Largest order

There are about 1,200 of these PoS terminals in the system, linked via modems over the public telephone network and Thorn TV's own extensive private network to British Telecom DCE 1 autodialling equipment at the regional centres.

At each centre the V77/200 feeds its branch telephone numbers to a bank of DCE 1s, and these units activate the calls, check whether the response is a ringing tone or engaged signal, persist until a connection is made and, on completion of the call, clear down and go to the next branch number in the sequence.

The Thorn order is the largest ever placed for the DCE 1 units and Rumsey spoke highly of the service provided by British Telecom — or Post Office as it was when the project was initiated. There was a very early deadline for delivery and also some administrative reorganisation of one of the rental company's commercial areas.

This altered the requirement for dedicated lines "but they coped with everything and gave us marvellous support," says Rumsey. One of the most remarkable features of the system is that every PoS terminal in all showrooms can be reprogrammed remotely from the central V77/600 in Swindon. This is done by using the communications network in the reverse of the normal direction to transmit a long, very complex algorithm developed by the Thorn team.

A successful live exercise using this facility proved that it eliminates the delays and disruption that can be caused by changes such as alterations in VAT.

When such a change is announced, it is necessary to implement the new VAT rate immediately. Formerly this was not possible, and consequently the company had to bear the cost of the extra tax until customers' payment books had been updated.

Now, it is possible to adjust rental directly as tax legislation comes into force. Rent reductions or increases can also be brought into effect easily and without delay after customers have been informed that such changes are planned.

### Excellent

Software for the Univac V77s was written by Detwiler Thomas and Associates. "They were very co-operative and did an excellent job for us," says Bob Rumsey's verdict. Software for the PoS terminals was developed jointly by Thorn and Data Terminal Systems.

"All monetary transactions at branch offices are recorded and processed on the microprocessor-based DTS point-of-sale terminals. The terminals keyboard has a numeric pad, colour-coded and labelled transaction keys and a further bank of keys, as yet unallocated, for use in future applications. Almost certainly one of these will be stock control. A

plasma display panel over the keyboard guides the operator.

The terminal also includes an optical wand with which show-room personnel can capture data encoded in a line of OCR-B characters on the payment slips in each customer's receipt book. This book is then inserted into the terminal for details of payments to be imprinted for the customer's information.

All transaction details are held in the PoS units memory for onward transmission to the regional centre in the evening.

At precisely 18.01 hours each day (one minute after cheap rates

come into operation) each regional Univac V77/200 begins to poll its branch offices via the DCE 1, using a disc containing the program and appropriate telephone numbers.

In readiness for this operation the branch terminal is set to the "transmit mode" at close of business. When transmission has been successful, a tick is displayed on the plasma screen. If for some reason transmission does not take place, a coded display indicates the cause.

In addition to recording the branch data, the regional V77/200 prepares and prints a consolidated

At each of 13 regional accounting centres in the Thorn TV Rental network there is a Univac V77/200 mini (centre) linked via a bank of British Telecom DCE 1s to each of 100 branch showrooms. The centre shown here is at DER's headquarters at Farnham, Middlesex, where each of 10 DCE 1s and their related modems handle data from up to 10 branches. The operator on the left is using the VDU and printer to monitor the system.

reconciliation and analysis.

Data from all 13 regional offices is recorded on disc by the Swindon V77/600 which also carries out reconciliation, consolidation and printing. This operation provides senior management with a nationwide picture of the day's cash movements.

Finally, the raw data on disc is written to ICL-compatible tape for batch updating of customer accounts by the ICL 1900 mainframe during the night. (This is shortly to be upgraded to a 2972.)

Thorn TV Rentals' new system

has successfully achieved its original objectives. Nevertheless, Rumsey is convinced it has only scratched the surface of its potential for yielding management information to be accessed via the existing inhouse viewdata system.

Already an international system of accounting on similar lines is being implemented, also based on Univac V77 minis. Soon computer terminals will be operating for Thorn TV Rental subsidiaries in several European and Nordic countries and in the Republic of Ireland.

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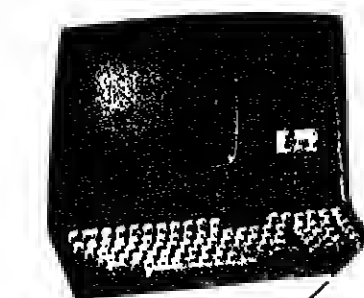
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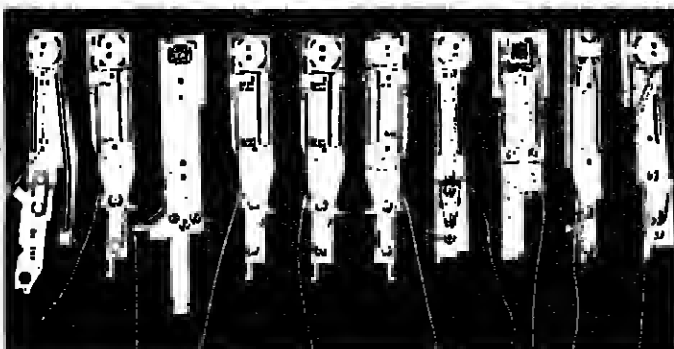
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Firms interested in tendering may obtain Outline Specifications for the installation  
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Requests for the Outline Specification should be received not later than FRIDAY 28  
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# Appointments

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Half Page (19 x 7 cols) = £1,430  
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Copy Deadline: 3.30 pm Monday prior  
Thursday publication date. Complete  
advertisements by 11 am Tuesday. Advanced  
space reservation is advisable

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Ron Welford, Classified Supervisor  
Ian Fox, Consultancies  
Julie Homalord, Consultancies  
Ceniso Smith, General Appointments  
Gillian Johnson, General Appointments  
Kevin McDermott, General Appointments  
Peter Regis, General Appointments

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	Ref.	
IBM DOS/VS COBOL Programmer with CICS	253	Holland
IBM 3033 MVS +IMS DB/DC COBOL Programmer	252	C. London
IBM 3031 OS COBOL Programmers	249	S. Coast
IBM OS/MVS senior PL/1 Programmers with DL/1 and CICS for long contracts	246	Dublin + Holland
IBM MVS COBOL and CICS Programmers	243	Yorks.
H'WELL COBOL Programmers with TDS/IDS	241	City
IBM System 3 RPG II Programmers	254	Holland

For details of these and other contract opportunities ring Richard Denise or Moray on 01-491 4706 (daytime) or 01-408 0280 (evenings and weekends)

KNIGHT OPERATIONS houses a full recruitment and contract service to the computer industry. We've been around for a few years now, and if you have too, and you're looking for contract or permanent employment, give us your information! Call 01-491 4706 or write requesting an application form.

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Perhaps it's time to secure a more rewarding job in time for Christmas?

### This week's latest Permanent Vacancies

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If you have RSTS experience our clients would be interested in seeing you for their PDP 11/70 installation. Good benefits well the right person, and excellent future promotion prospects. Three-shift system.  
Salary: to £8,000 inc. p.a.

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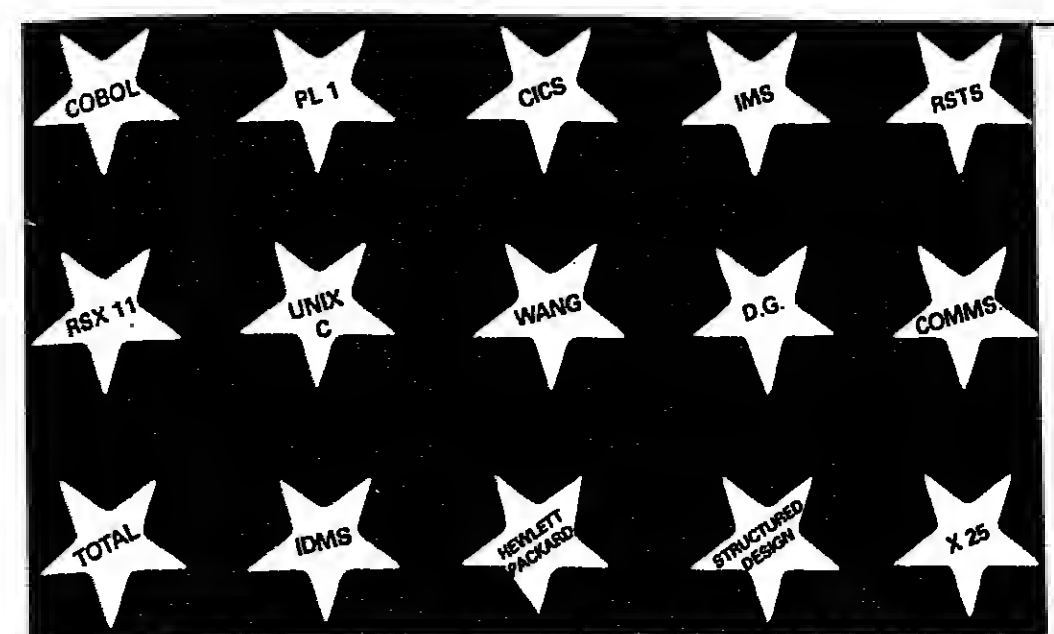
Always RELY ON KNIGHTS! Rachel Martin and Theresa Ferrell are here to give you details on the above and other vacancies.  
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Feltex are seeking computer professionals who have worked in a manufacturing, marketing or financial environment. Ideally you will have:

- A minimum of three years experience
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- A record of successfully implementing systems
- Experience in an interactive environment.

**BENEFITS** New Zealand offers a quality of life that is sought after by many more specifically Feltek offers:

- Top New Zealand salaries
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- Return air fare on contract assignments

Final interviews will be conducted by the Group Data Processing Manager in the week commencing 8 December. In the first instance however, please telephone Chad Stolper of Prescott Computers Limited on (01) 434 2698/9. If you prefer write to him at:

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## Will you be part of Europe's most advanced Custom IC Design Facility

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# New Zealand - Auckland

Contract Assignments (2-3 years)  
or Permanent Employment

FELTEX is one of New Zealand's major commercial and industrial organisations. They are embarking on major computer development using PDP equipment and are committed to applying the latest technology to practical commercial situations. They wish to recruit:

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- Stimulating career challenge
- Re-location expenses on permanent employment
- Return air fare on contract assignments

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## RT Micro Systems Technical Staff & Project Leaders to £12,000

We have been retained by a foremost systems house, to assist in the recruitment of a number of high calibre technicians, each of whom must have a minimum of 2 years' working on real time software design and implementation. Additional experience of multi-processor systems architecture, communications network and micro-based distributed data base would be extremely useful. A unique mixture of small team involvement within a technically advanced environment - the best of both worlds.

## Senior Analyst/Programmers Dublin to c.£11,000 + benefits

An established systems house operating throughout the Republic from the Dublin office currently have urgent need to strengthen their project teams. Working mainly on financial systems on IBM hardware you will be responsible for assessing client requirements, designing, programming and implementing the specific systems and be involved with all aspects of customer support. It is essential that applicants have sound commercial analysis knowledge with several years' COBOL and DLI as well as good experience of a CICS system. You must also display the ability to communicate at all levels and be prepared to travel when required. A negotiable salary is available plus expenses, an annual bonus and relocation to the right applicant.

## System Programmer Essex £10,000 +

This is an excellent opportunity to join a well established organisation, who are aiming to provide efficient and reliable systems to user departments. It is essential to have a sound IBM background with a minimum of one years experience of DOS/VSE and extensive knowledge of CICS. Responsibilities will cover advice and investigation on the use of new software. Introduction of enhancements and diagnosis of operational problems. The company offer good career development and rewards are given on the basis of individual results achieved.

## Programming Team Leaders City to £10,000

Our Client, an International Shipping organisation which is embarking on a major programme of new applications development, is seeking two Senior Programmers to lead existing project teams. It is essential to have at least four years programming experience, consisting of two years on IBM mainframes using COBOL with extensive knowledge of OS/VS. The ability to write programme specifications and modularizations is of prime importance.

## Technical Support Analyst Hampshire £9,000

Our Client, a professional and well established service organisation are looking for an experienced ICL 2900 person to join their support team. It is essential to have four years data processing experience, with 2 years COBOL and 12 months practical knowledge of the facilities of VM/VS, systems design and IDMS. Excellent conditions of employment and a good benefits package are offered, also generous relocation assistance where appropriate.

## Mini Support Analyst Programmers London £7,000-£8,500

Due to steady expansion, our Client, an internationally known mini manufacturer, specialising in the marketing of banking, word processing and library circulation systems, wishes to recruit two programming professionals in their development/support team. A minimum of two years on-line programming experience, preferably gained in a mini environment, would be ideal, but consideration will be given to high calibre candidates with a sound on-line programming background. Training facilities and career prospects are excellent as this organisation firmly support promotion from within.

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Applications with a curriculum vitae and the name and addresses of three referees should be sent to Mrs. P. Hughes-Smith, Staffing Department, The University, Southampton, SO9 0WU. From whom further particulars may be obtained. Please quote ref: 1771/A/W.

## IBM Support Programmer

Hampton to £11,000  
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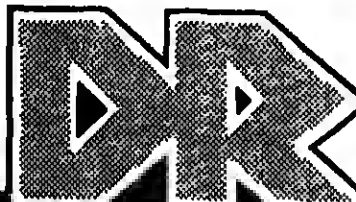
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LANGUAGES USED _____	
PHONE HOME _____	BUSINESS (will be used discreetly) _____
YRS ANALYSIS _____	YRS PROGRAMMING _____
MACHINES USED _____	
JOB SOUGHT _____	LOCATION _____
SALARY _____	SALARY REQUIRED _____ CW 20/11



**DATA RESOURCES AGENCY**  
P.O. Box 63  
8th Floor Copthall Tower House  
Harrington HG1 1TS  
Tel: (0423) 55311/3  
(24 HOUR ANSWERING)

Central Chambers  
11 Bothwell Street  
Glasgow G2 6LY  
Tel: (041) 226 4812

RECRUITMENT AGENCY

## MARK IV

### Permanent Staff

Tangent Computer Service is a successful Software Support organisation with diverse U.K. and International activities. The company's ability to select, retain and develop the talents of skilled professionals has been an important factor in its growth and has enabled an excellent reputation to be maintained.

Expansion in both our U.K. and U.S.A. Companies is such that we require to augment our MARK IV teams with:

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For more information telephone

Alan King  
TANGENT COMPUTER SERVICES  
102/106 South Street  
Romford, Essex  
Tel: Romford 760201

(3846)

Recruitment **LOGISTIX** In Informatics

## Junior Applications Programmers

Rhineland Germany: Salary 14K

A German Chemical and Pharmaceutical Company has requested LOGISTIX to identify and recruit Applications Programmers and Analysts/Programmers for its recently upgraded IBM installations. The Company is situated in an area of outstanding natural beauty and within three hours' drive of six neighbouring countries. It is essential that all applicants have a minimum of 2 years' COBOL, Assembler or PL/I programming experience although the hardware involvement is irrelevant, since excellent in-house training and manufacturing courses will be provided. The Company is planning to implement an SNA network during the next 2 years and will therefore be daily involved in development work. These positions represent an outstanding opportunity for career-minded professionals aged 23-28 years to enhance their technical skills whilst simultaneously enjoying the diverse cultural benefits of another society. Ref: L/47/A

## Mini/Micro Software Development

Beds/Cams.: Salary to £10K

Our client is a highly respected Systems and Software Supplier having its Research and Development Facility in a most attractive East Anglian location. Current requirements are for Development Programmers offering a minimum of 18 months' Basic or Assembler programming experience on any mini-computer or micro-processor. These positions will appeal equally to those with a scientific/academic computing background or commercially inclined Programmers. Offering a comprehensive range of in-house hardware, unrivalled development aids are available for ambitious, career-minded individuals. The salary and excellent ancillary benefits represent an outstanding opportunity for those keen to participate in "state-of-the-art" software and hardware projects. Interviews can be arranged both locally and in London. Ref: L/47/B

## ICL Applications - Canada

Full Contract Package

We are seeking several Programmers and Analysts/Programmers for 6 months' renewable contract positions in several Canadian Provinces (not East Coast locations). The required programming skills are: ICL 2803-3 or ME29 COBOL with either MTS or IDMS software experience. The applications are inventory stock control and order entry processing. Previous programming development in these areas is an obvious asset. In addition to an excellent contract rate, accommodation and travelling expenses will be paid. Initial interviews will be held within seven days of the appearance of this advertisement. Late 1980/early 1981 start dates are envisaged. Ref: L/47/C

## S/W Designers & Engineers

Swindon: Salary to £11.5K

One of Europe's leading communications companies urgently requires Programmers and Engineers to join its Communications Development Group. Successful applicants will have 2-3 years' mini-computer or microprocessor Assembler experience. Some positions require active and regular pre- and post-sales support, whilst others demand a knowledge of not only software but also firmware development techniques. Of particular interest will be those candidates currently engaged on real-time military applications or, alternatively, have exposure to System X orientated processors. Ref: L/47/D

## Datapoint Programmer/Analysts

Belgium: Salary to £16K

Our client's recently established Benelux subsidiary is seeking several Programmer/Analysts to join its permanent payroll. Respondents must offer a minimum of two years' programming experience and a minimum of twelve months on Vax/VME Datapoint hardware. On-line and teleprocessing skills are particularly valuable and will reflect in the salary. A proven ability or strong desire to act in both pre-sales and customer support roles is a decided advantage as are personal communication skills. It is envisaged that these appointments will be taken up in February, 1981. First interviews will be held in London and short-listed candidates will be invited to Belgium. Ref: L/47/E

## Software Support - Graphics

Stth Manchester: Salary to £10K

One of the market leaders in the development, manufacture and sale of graphics terminals and instrumentation devices has a requirement for Analysts/Programmers and Project Leaders for its Manchester Regional offices. Successful applicants will be involved in pre-sales support, the installation of software packages and training customer personnel through the medium of seminars and video demonstrations. Candidates should be ambitious engineers with an in-depth knowledge of Electronic Engineering and Microprocessor techniques. Software Support Programmers should offer at least 18 months' BASIC or PASCAL programming experience on any leading mini or micro computer. Interest in Personal Computing will be a distinct advantage. For all positions, candidates must demonstrate the ability to liaise with customers and solve any problems which may arise both quickly and professionally. Ref: L/47/F

## Micro Support

Central London: Salaries to £8K + Car

Our client is a leading Micro-Computer Manufacturer, with offices in both Inner and Greater London. The rapid increase in sales of its Business Systems has created vacancies for additional Micro Service Engineers and Software Support Programmers to maintain and enhance its reputation for outstanding post-sales hardware and software support. As a Micro Service Engineer you will support the increasing customer base of micro-computer systems and terminal products. Full training will be given to young, ambitious engineers with an in-depth knowledge of Electronic Engineering and Microprocessor techniques. Software Support Programmers should offer at least 18 months' BASIC or PASCAL programming experience on any leading mini or micro computer. Interest in Personal Computing will be a distinct advantage. For all positions, candidates must demonstrate the ability to liaise with customers and solve any problems which may arise both quickly and professionally. Ref: L/47/G

Logistix, 10 Grenville Place London SW7 4RW

01-373 3063



Telex: 28800

(3578)

0702-615551/2

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### CONTRACTS

## IS 1981 GOING TO BE YOUR YEAR?

### ABU DHABI

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## ICL 1900 COMMS. SOFTWARE PROGRAMMER

Knowledge of Comms. Manager, Line Protocols, Term, Exchanges, Maximp, Datadrive, G11 COBOL

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Vacancies exist in the following areas:

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On-going requirements for programmers, analysts/programmers with good JCL 2900 background, including IDMS and/or T.P.

## NORTH WEST + MIDLANDS

JAN., FEB., MARCH, APRIL, 1981

STARTS FOR

## 2900 COBOL PROGRAMMERS

## 2900 T.P. + IDMS ANALYSTS/PROGRAMMERS

## EXPERIENCED - MICRO PROGRAMMERS

with Design Experience.

The above positions to start throughout the New Year with long + lucrative contracts.

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ADDRESS \_\_\_\_\_

TEL DAY \_\_\_\_\_

TEL EVE \_\_\_\_\_

(3608)

## ANALYST PROGRAMMERS and PROGRAMMERS

East Midlands  
Salary to £8,000 per annum  
and index linked

Our clients are a major consultancy providing services both at home and overseas.

Due to continuing expansion they seek to strengthen their existing team based in the East Midlands.

You should offer experience of at least eighteen months as a Programmer or Analyst Programmer in a commercial environment. Experience of ICL System 10 Assembler, Cobol or RPG II will be of particular interest.

In this highly professional environment you will rapidly advance your skills in the following areas:

Real-time mini-computer techniques  
Development from investigation to implementation  
User Liaison

The broad range of commercial applications.

You will enjoy much variety in your work and will have the opportunity to quickly progress to full project responsibility.

Salaries are highly competitive and increase automatically with inflation. Relocation assistance will be considered where appropriate.

Male or female candidates should contact Patrick Convey quoting reference number CW290.

**COMPUTER PERSONNEL  
CONSULTANTS**  
18th Floor, The Rotunda  
Birmingham B2 4PA  
021-632 6848



(3516)

April 1981



# ... CONTRACTS ... CONTRACTS ... CONTRACTS ...

IBM 370 COBOL CICS Programmers  
IBM 370 PL/1 or COBOL with DB/DC Programmers  
IBM 370 Programmers  
IBM 8100 COBOL Programmers/Designers  
IBM System 34 RPGII Programmers  
IBM 370 DB/DC Designers/Analysts  
ICL 2900 VME/B Programmers/Designers  
Burroughs B6800 Programmers  
UNIVAC 1100 Exec 8 Programmers  
Banking/Insurance Analysts/Designers  
Process Control Designers

The above is only a small selection of the many requirements we have to fill throughout the UK and overseas.

## Contracts VNG

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Ask for Vic Groves or Brian Broderick  
or send coupon—we will contact you  
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Name \_\_\_\_\_  
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Tel (Home) \_\_\_\_\_ Tel (Work) \_\_\_\_\_  
Post to: 'FREEPOST' VNG Professional Services Ltd  
Knutsford Cheshire WA16 7BR

Please send First Timers Guide ☐

## The people who ask 'What recession?'

THE age of the independent contractor has arrived. More and more data processing professionals are turning freelance, successfully selling their talents in an open market, a trend that is being followed by accountants, engineers and even senior management in industry.

Until recently, freelancing was frowned upon and the supply of external resources to computer users was the province of software houses, offering permanent staff on a time and materials basis.

This changed radically when agencies were formed specifically to handle the affairs of independent contractors. The software houses have found it progressively more difficult to compete ever since.

Some software houses have now dropped out of this marketplace completely, concentrating on in-house project work, unable to match the agencies on the price and range of skills on offer.

### Philosophy

But this is on the supply side of the equation. What about demand?

Although minor geographical differences do exist, the general philosophy of users throughout the UK is that

Freelancing in the DP industry is becoming increasingly popular. Not surprising when demand is so high that contractors are asking "What recession?" VIC GROVES discusses this situation and offers some advice to would-be independent DP professionals. Groves has spent several years in the computer industry: in 1975 he set up his own company, Quadrant Computer Services, which soon became a leading UK software house. In 1978 he left the mainstream of the software industry to develop a secure market place for freelancers, with the establishment of VNG Professional Services Ltd.

computerisation will help their companies out of recession. Redundancies may be taking place in other departments, but contract staff are still required within data processing.

In addition, companies breaking new technical ground are usually prepared to buy expertise. Enforced changes mean that many companies have no choice but to supplement resources, and the demand from overseas has never been higher.

In summary, contractors with a solid base of experience and a good armoury of skills are still very much in demand. Contract length is on the increase as is the interest content of the work. Many contractors placed by my company recently have moved

into leading edge development work. One first-timer made his first job move for ten years!

But, if you are a contractor without a contract now or for much longer, or if you are a frustrated employee itching to make the break into your first contract, you will doubtless be wondering how to find such long-term security and high job satisfaction.

### Register

First, prepare yourself properly so that your skills and strengths are represented clearly and comprehensively to a third party, via a CV that does you justice. It is disconcerting to receive a badly laid out single page career summary from someone claiming many years' experience.

Secondly, register yourself with two or three agencies that really know the business, in which you can trust, and have confidence.

If you are a first-timer, there is another matter to be at before registering. Establish what advice and guidance is available on how to set up a limited company, and so on — a booklet, perhaps?

Now let's look at the future. The recession is causing a shortage of work in certain areas, aggravated by some contractors having limited skills and not being prepared to travel, or move to where the work is. However, within the major computing centres of the UK, experienced professionals with good expertise who can present themselves well have an assured future.

When the recession works through, the demand for new systems must increase further and the current shortage of DP staff will get worse (or better, depending on which way you look at it). It is fair to predict that 1981 will see a significant increase in demand for contract staff.

My company's order book has never been fuller and we frequently find ourselves asking the question "What recession?"

We need more people.

## MYRIAD

### NEW PROJECTS

NEW JOB . . . SYSTEMS ANALYSTS  
NEW MACHINE . . . IBM 4300  
NEW YEAR . . . YOUR FUTURE

The company is a highly successful division of a major international organisation and is about to invest heavily in Data Processing next year with new hardware and development projects. To spearhead this venture, an experienced Systems Analyst is required to undertake projects from feasibility. Offering a wide range of interesting applications, this position requires initiative, good liaison qualities and the experience of previous project success.

Although based in the North West of London the position will involve travel to remote operating units, where a car allowance contributes to an attractive salary package of £10,000.

Ref: N1/2011

### NEW IBM INSTALLATION

ANALYSTS AND PROGRAMMERS  
Middlesex To £10,000

Additional Analysts and Programmers are required now to enhance the Systems and Programming Team of a major organisation able to offer a secure future and positive career development.

A range of interesting and varied systems are scheduled for development and implementation on a new IBM 4331 to be delivered in 1981.

PROGRAMMERS should have at least two years' experience programming in COBOL or RPG II on IBM or compatible hardware.

ANALYSTS should possess a programming background and over two years' analysis experience.

An outstanding benefits package combined with the opportunity to gain formal training and move to IBM hardware make this a challenging and valuable career move.

Ref: C1/1311

(3818)

### MYRIAD APPOINTMENTS LIMITED

30 Fleet Street London EC4Y 1AA Telephone 01-353 0981 24 hours

(3818)

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NEAR WINDSOR

£8-£10,000

The development of new products for advanced Data Management and Interactive Transaction Processing Systems, has created additional vacancies for systems software programmers with our client — a major American computer manufacturer.

These positions will appeal to people who enjoy software design and development in a small project team environment where individual creativity and contribution is recognised. If you are able to offer ASSEMBLER programming skills together with some COBOL knowledge, then you can look forward to a role involving significant project responsibility and technical challenge.

The company, located in modern offices easily accessible by both public and private transport, is able to offer attractive associated benefits in addition to a competitive commencing salary.

Ref: NW1/2011

## Victoria Appointments Limited

### THE PERSONAL PERSONNEL SERVICE

We are always looking for Professional Freelance Programmers, Analyst/Programmers and Systems Analysts with at least 4 years' sound experience. For assignments in the North-West of England and Holland.

We can offer you:

- Competitive Rates.
- Continuity of high quality assignments.
- Professional Guidance in all financial matters if required.
- And of course all the other facilities you can expect from an established organisation with a high reputation.

For further information and details send your CV FREEPOST or telephone

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# FREELANCER!

Contact Quadrant for Contracts

Quadrant, a leading Northern Software House, is now able to offer Freelancers exciting contracts at exceptional rates.

<b>COBOL IBM PROGRAMMERS</b> We have many positions available for COBOL programmers with an in-depth knowledge of CICS and DL1 — all levels of experience will be considered.	<b>SYSTEMS PROGRAMMERS</b> Exceptional long term contracts for Systems Programmers who have an in-depth knowledge of IMS — DB/DC. Excellent rates will be offered to the successful candidates.
<b>DESIGNERS</b> Experienced DL1 Designers required for interesting long term contracts in the Lancashire area.	<b>COBOL/ASSEMBLER PROGRAMMERS</b> We have a number of positions for ASSEMBLER/COBOL programmers with a knowledge of CICS — who have at least 2 years commercial experience.
<b>COBOL ICL PROGRAMMERS</b> Excellent long term contracts available for experienced ICL COBOL programmers with an in-depth knowledge of VME/B.	<b>PROGRAMMERS</b> An opportunity to gain IMS experience if you have an in-depth knowledge of VME/B — we will train you in IMS.

ALL THE ABOVE POSITIONS ARE ALSO OPEN TO PERSONS SEEKING PERMANENT EMPLOYMENT

DON'T DELAY — CONTRACT TODAY!

Contracts — North West  
Contact Peter Smith  
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Contracts — North East  
Contact Irene Rogers  
on 0724-730794

or to find out more phone 0924-71010 (evenings)

## Quadrant Recruitment Ltd

Ashby House, Ashby Road, Altrincham WA14 2DB  
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## A STEP FORWARD

FOR SENIOR PROGRAMMERS WHO WANT TO MOVE INTO ANALYSIS  
FOR PROGRAMMER/ANALYSTS WHO WANT TO BE ANALYSTS  
FOR SYSTEMS ANALYSTS WHO ARE READY FOR MORE RESPONSIBILITY

- Salaries to £9,000 p.a.
- Home Counties location
- Technical variety — micros, minis and IBM 370
- Bonus / training / relocation

Our client is a large company operating in the leisure and related areas. They depend heavily on computers and offer a secure future with plenty of technical challenge and good career development opportunities. All senior data processing positions are filled by promotion, not by recruitment.

They are now seeking experienced data processing staff to contribute to the development of new batch, on-line and database systems.

The main recruitment requirement is for analyst/programmers. If you have programming capability in BASIC and can offer either COBOL or PL/1 as second language, the company will give you the necessary training, exposure and experience in systems design. If you have current systems design experience, so much the better.

If you are a systems analyst working on commercial systems development, you could play a significant role in advising junior staff and planning new systems.

The department has an IBM 370/138, two PDP11 minis and an increasing number of Cromemco micros. There is a wide variety of up-to-date software including interactive program development.

These are first class career opportunities offering a secure future with a large technically advanced company.

Salaries are very good and there is a package of worthwhile benefits including a substantial bonus, WPA sickness scheme, luncheon vouchers, generous staff discounts and help with relocation costs where appropriate.

For more details about the company and its future plans, please call Sue Blundell or write to her at the address below.

271 High Street  
Berkhamsted, Herts.  
Phone: (04427) 74941

Permanent and  
Contract Staff



**CASTLE**  
RECRUITMENT

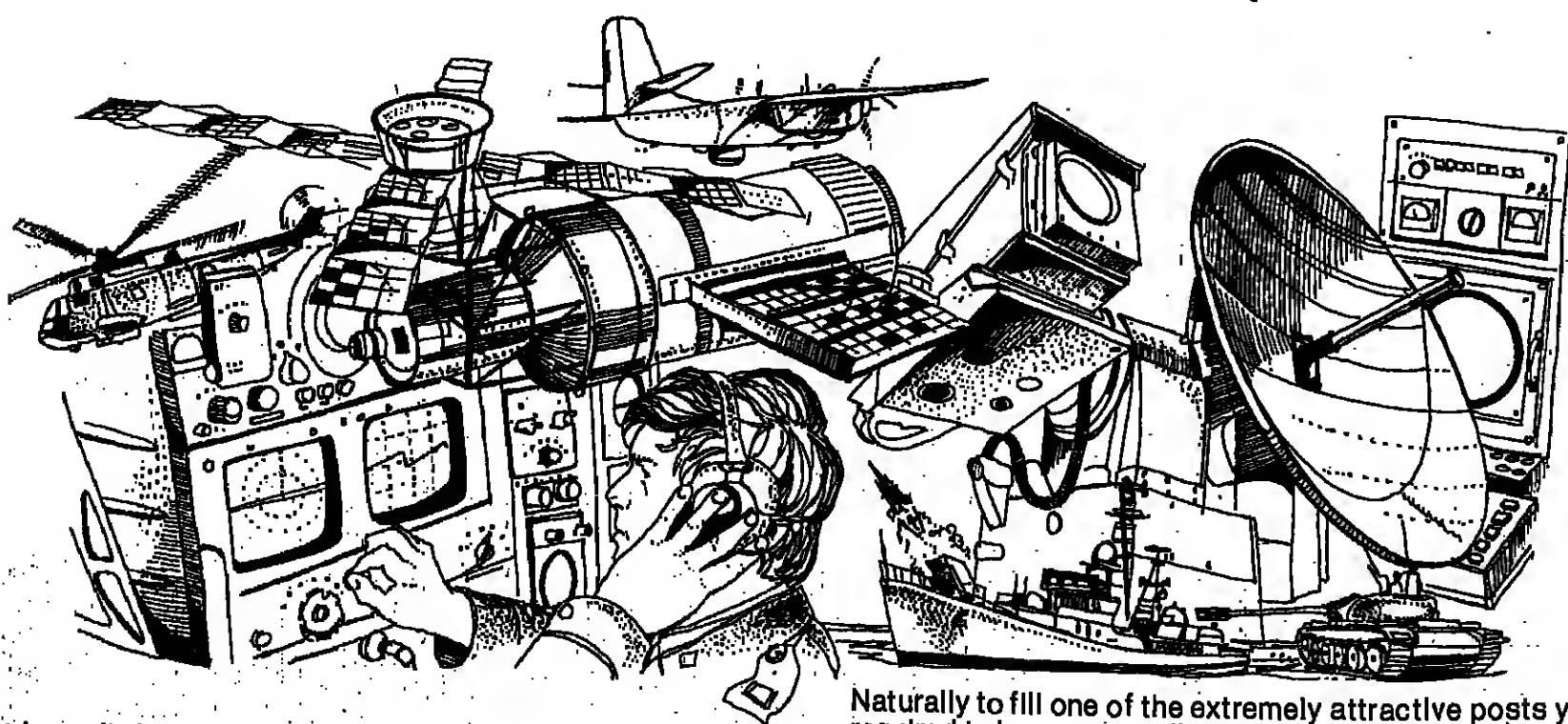
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# REAL TIME SOFTWARE DESIGNERS

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**LONDON / HOME COUNTIES**

Our Clients are the U.K. subsidiary of a well established American systems house operating in the scientific field with a considerable reputation for its technical excellence. Not only have they already opened two major offices close to London but a third is planned for early next year with the intention of establishing centres throughout the U.K. at a later stage.



What is certain to attract you is their well established customer base in the following fields:

**MILITARY SYSTEMS**  
**AVIONICS**  
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**PROCESS CONTROL**  
**OPERATING SYSTEMS**  
**COMMUNICATIONS**

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TELEPHONE: 01-353 7141 (24 HOURS)

Naturally to fill one of the extremely attractive posts you will be required to have an excellent educational and technical background with good experience in real time systems and assembler programming.

In particular our clients value:

- \* Familiarity with such mini-computer systems as DEC, GEC, SEL, DG, HP or GA.
- \* Firm knowledge of high-level technical scientific language e.g., CORAL, PASCAL, FORTRAN or RTL.
- \* Experience in micro-computer systems.

We are looking for high-grade staff and the financial rewards are excellent as is the demonstrable career progression. This could be your chance to join a dynamic team of first class professionals who are committed to building up a wide range of professional services. Remuneration, depending upon experience, will naturally be enhanced by the normal benefits expected with an established organisation. Where travelling is required a generous car allowance will be paid.

For further information or to arrange an interview please contact ROY HIGHFIELD quoting reference CW2011.

# Hutton

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Manchester 061-633 0427 Blackfriars House, The Parsonage, Manchester M3 2JA  
Brussels 010 322-640 7151/71 Avenue Louise 327, Boite 4, 1050 Bruxelles

Specialist Computer Recruitment Ltd

### DIRECTOR OF COMPUTER BUREAU

The Computer Bureau is operated as a service unit for both academic and administrative departments. Interactive computing facilities are supported by an IBM 4341 computer with 2-Mb of main memory and a Digital Equipment VAX 11/780 with 1-Mb of memory.

In recognition of the increasingly important role of computers and the wider requirements for external services, the College has under consideration a proposal to incorporate a Regional Computing Centre in the Bureau.

Applications are invited for the vacant post of Director. Candidates should have extensive experience in the management of a major computing facility, preferably in an academic or research environment and should also have appropriate professional qualifications. The salary scale is: £14,932-£17,205 per annum.

Further particulars and application form are available from the undersigned to whom complete applications should be sent to arrive not later than Monday, 18 December, 1980.

M. F. Kettlebar  
Secretary  
(1980)

### Thames Polytechnic

Computing Services Centre

#### Computer Applications Adviser

The Computing Services Centre and the School of Architecture and Landscape invite applications for a post of Computer Applications Adviser. The applicant should preferably be an architect with training in computer science and experience of teaching applications of computing to architecture. The position is a full-time post with responsibility for the introduction and application of computing to architecture. The post is temporary for one year in the first instance. Salary scale: £2282-£6942 inclusive.

Further particulars and application form from the Secretary, Thames Polytechnic, Watlington Street, London SE18 6PP to be received by 9 December, 1980.

### SYSTEM 34 RPG II

Contract Programmers  
urgently required for London  
assignment.  
TEL. 01-606 1738

### UMIST

CONTROL SYSTEMS CENTRE

#### RESEARCH ASSISTANT

REF: CSO/219/80. Applications are invited for the above post to work on the development of new software techniques for the on-line interactive design of control systems. A knowledge of control system design methods would be valuable but software development experience is more important. The successful candidate would be responsible for a substantial research project for a high degree.

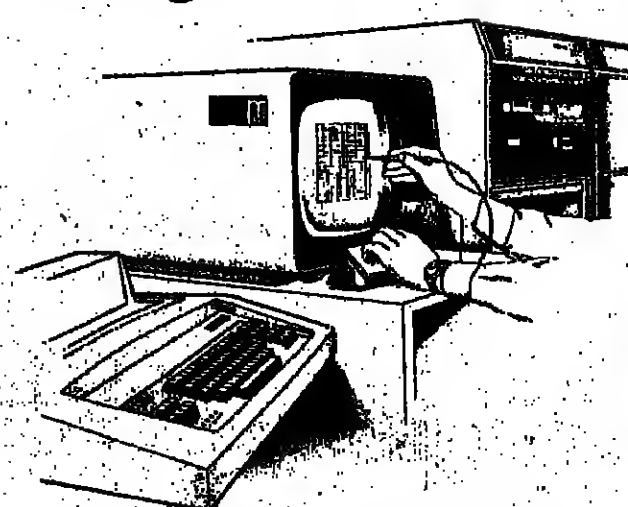
Salary will be in the range £4700-£5500 per annum. Requests for Application forms and further particulars, quoting the above reference, should be addressed to the Secretary, Room 116, UMIST, PO Box 167, Manchester M60 1UD. The closing date is 5 December, 1980.

## Programmers Customer Service- A lot more than just Programming

Customer Service and Software Maintenance are becoming an increasingly important function within modern progressive computer systems companies. Racal-Redac Ltd., are recognised as world-leaders in the field of Computer Aided Design and we have attained this enviable position because of our capability to develop and maintain advanced CAD Systems.

Furthermore, the growth of customer service has resulted in the development of unique career paths for Software Specialists. Our Programmers are in daily contact with our customers in order to ensure the problems are rectified quickly and that his requirements can be recognised and acted upon efficiently. The work is certainly interesting and varied and will appeal to you if you:-

- \* like defining and solving problems
  - \* do not wish to limit your horizons to just software
  - \* like meeting customers at customer site
- The work will inevitably involve travel both within the U.K. and Europe and opportunities may exist to work in the U.S.A. for short periods. Applicants should hold a relevant degree or HNC qualification and have at least two years experience, preferably in a Customer Support environment.



Salaries and employment benefits are commensurate with the responsibility of the positions and career prospects are excellent within Redac, one of the fastest growing companies within the Racal Electronics Group.

Please apply with details of age, experience and current salary to:  
Brian Ashcroft  
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Newtown, Tewkesbury  
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Tel. 294161



Britain's fastest growing electronics group

**RACAL**

01-606 1738













The Hong Kong Polytechnic is a large institution of advanced education which offers courses in a wide range of subjects. In addition to three major academic Divisions comprising 18 teaching departments, it also has a number of inter-disciplinary institutes and centres. For the academic year 1981-82, emphasis will be placed on developing high level programmes and applied research activities relevant to the needs of Hong Kong. It is also envisaged that a number of vocationally orientated degree programmes will be introduced in this institution.

The Polytechnic invites applications for the following posts which are available from September, 1981.

## DEPARTMENT OF COMPUTING STUDIES

Principal Lecturers/  
Senior Lecturers/  
Lecturers

In such Design of Real-time Systems, Computer Aided Design & Graphics, Systems Programming, Installation Management, Management Information Systems, Systems Analysis and Design, Applications Programming, Computer Systems, Data Base Management, Computer Applications in areas relevant to the Polytechnic including Engineering, Mathematics, Architecture, Business Studies, Textiles, Applied Science and Design.

## QUALIFICATIONS FOR APPOINTMENT AND SALARIES

**Principal Lecturer:**  
HK\$128,600.  
HK\$102,760 p.a.

Candidates should have (a) a degree or professional qualification and an advanced specialist qualification or extensive experience in a specialised field; (b) substantial professional experience; and (c) proven administrative ability.

**Senior Lecturer:**  
HK\$107,580.  
HK\$153,960 p.a.

Candidates should have (a) a degree or professional qualification and preferably an advanced specialist qualification; (b) substantial professional experience; and (c) proven administrative ability.

**Lecturer:**  
HK\$81,380.  
HK\$102,189 p.a.

Candidates should have a degree or professional qualification and, in some cases, at least a Higher Technician qualification; and (b) at least three years professional experience.

Note: £1 = HK\$12.2 on 18th November, 1980.

## CONDITIONS OF SERVICE

Appointment will be on two-year gratuity-bearing contract terms initially. Thereafter suitable appointments may be offered further contracts or permanent terms of service at the discretion of the Polytechnic. Benefits include long leave; subsidised accommodation for the overseas appointees; and local appointments on a salary of HK\$8,515 p.m. or above; medical and dental benefits; children's education allowance and a terminal gratuity of 25% of basic salary received over entire contract period.

Application forms and further information are obtainable from the Hong Kong Government Office, 6 Gatten Street, London W1X 3LB, U.K. Completed application forms should be returned to the same office by 8th December, 1980.

(3578)

# New Career Horizons and Hampshire..... in one move



BOCM Silcock is a Unilever Company and a market leader in the manufacture of sophisticated farm animal feeds throughout the UK.

We wish to strengthen our development and maintenance team to support a major programme of existing applications and new developments. As part of the total company DP plan, development of several large applications for factory operational activities

— including order processing and factory planning — is due to commence shortly.

Our policy of distributed processing is supported by a wide range of hardware with appropriate communication links: ITEL AS/5 mainframe, 3 PDP 11/34's, 20 Datapoint minis plus microcomputer equipment.

## Project Leader — c. £8000 — £11,600

This new appointment, reporting to the Computer Development Manager, involves active participation in development projects at all stages from feasibility study to implementation including systems analysis and design, project planning and project leading.

You should be a DP professional with a sound background in commercial computing including team leading. Experience of microcomputer systems an advantage.

## Systems Analyst/Programmers, Systems and Support Programmers — Salary Range £6000 — £8000

Activities include system and program specification, program design, writing, testing, implementation and support; assisting in user training and liaison with project and user management.

You should have at least two years' experience of commercial programming. Knowledge of COBOL or PL/1, IBM OS JCL and/or minicomputer applications an advantage.

For all appointments, employment terms and prospects of advancement are excellent with generous re-location assistance available if appropriate. The positions are based in Beelingsgate which is within easy reach of London yet has the advantages of a rural location and good access to the South Coast and New Forest. Candidates, male or female, interested in joining us should indicate their initial job preference and send brief but comprehensive personal and career details (including salary) to:

## BOCM SILCOCK



Alan Coates,  
Staff Personnel Manager,  
BOCM SILCOCK LTD.,  
Beelings View, Beelingsgate, Hants.  
Tel: Beelingsgate 29211, ext. 378.

(3600)

## SENIOR SYSTEMS ANALYST

An experienced data processing professional is required by this production division, which is part of the Sterling-Winthrop Organisation based near Sheffield, engaged in the manufacture of d.i.y. industrial and domestic hygiene products.

Using an IBM System 34 we are currently engaged on computer projects which require new operating and system philosophies being generated and have new projects coming on stream. Thus it has been decided to create this position within our small data processing department.

The person appointed will report to the Data Processing Manager and deputise for him as required. He or she will be expected to make an early effective contribution and will therefore have experience of IBM G.S.D. equipment ideally in a manufacturing environment. The job will involve the development and implementation of important new projects including major extension and development of an I.P.N.C.S. package involving provision of on-line screens plus the implementation of other production related systems.

This is a senior staff position offering an attractive salary and terms of employment commensurate with those expected from a large organisation.

Please write or ring (Sheffield 487777, Ext. 118) for an application form to Roy Gantworth, Personnel Manager.

STERLING PRODUCTION DIVISION  
Chapelton  
Sheffield S30 4YP

(Sterling Production Division)

(A member of the Sterling-Winthrop Group)

## Thames Polytechnic

### Computing Services Centre Computer Applications Adviser

The Computing Services Centre and the School of Architecture and Landscape Architecture are seeking for a post of Computer Applications Adviser. The applicant should preferably be an architect with knowledge in computer systems and experience of teaching applications of computing to architecture students; experience in consulting with clients for the introduction and application of computer technology to architecture will also be considered. The post is temporary for one year with the possibility of extension.

Salary will be £22,000-£24,000 p.a.

Further particulars and application forms from the Staff Office, Thames Polytechnic, Watlington Street, London SE18 6PP, can be obtained by 8 December 1980.

## UMIST CONTROL SYSTEMS CENTRE RESEARCH ASSISTANT

REF: C02/218/80. Applications are invited for the above post to work on the development of new software techniques for the control of industrial systems. A knowledge of control systems and software development is essential. The successful candidate will be responsible for the design, development and testing of software for a range of industrial systems. The post is for a period of 12 months, starting in January 1981. Salary will be in the range £7,000-£8,000 p.a.

Requests for application forms and further particulars, including the above reference, should be addressed to the Director, Room 80, UMIST, PO Box 167, Manchester M60 1UD. The closing date is 9 December, 1980.

(3634)

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Please write giving full details of your career and salary progression and listing any companies for whom you do not wish your application to be considered to: G.N. Lacey, Partner, MCP Management Consultants, Royal Liver Building, Liverpool L3 1JH.

(3600)

60 Queen's Gardens  
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20th November 1980

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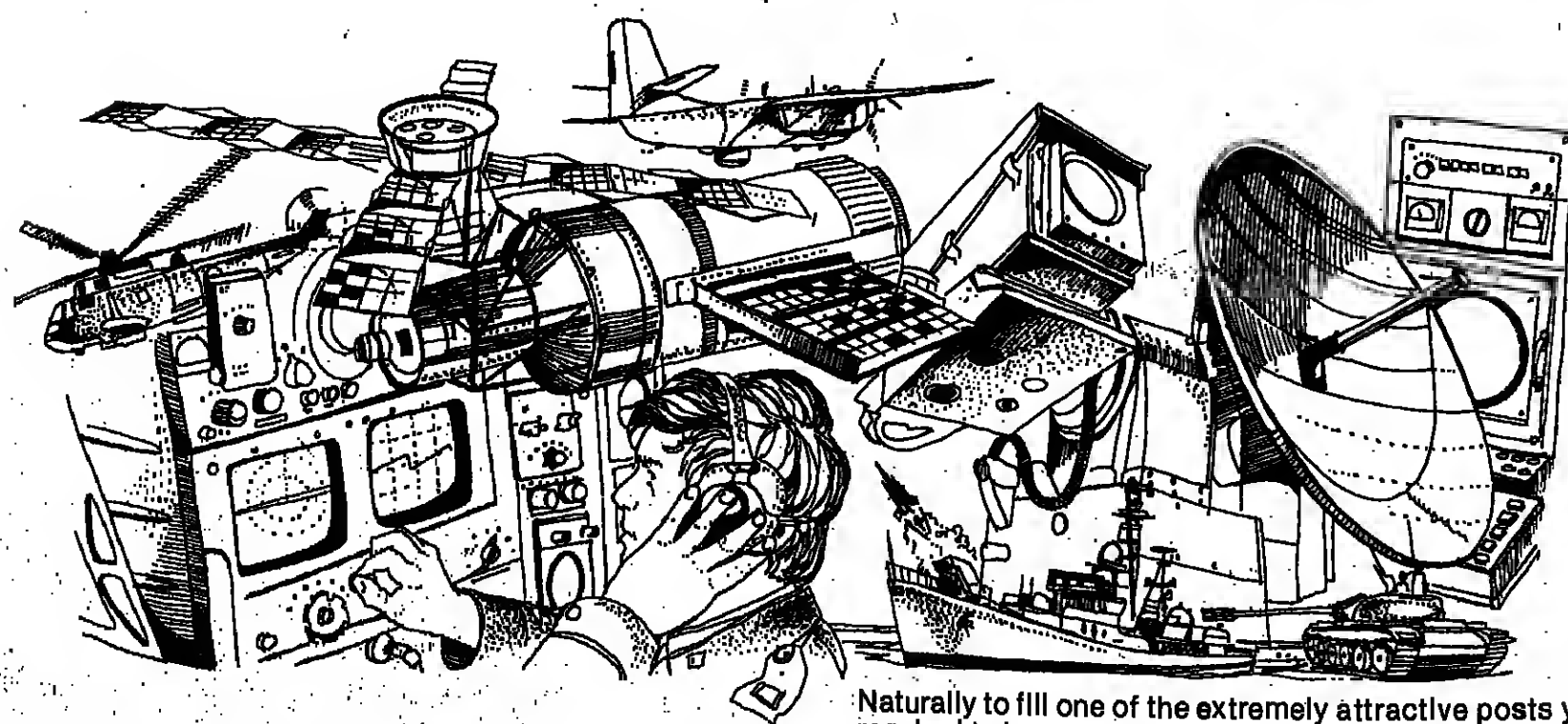




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For further information or to arrange an interview please contact ROY HIGHFIELD quoting reference CW2011.

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## YORKSHIRE REGIONAL HEALTH AUTHORITY

The Authority's Computer Centre situated in Harrogate provides a regional service to the seven Area Health Authorities in the Yorkshire region. The Centre operates on ICL 1904S computer running under the GEORGE 3 operating system and plans are in hand to install ICL 2900 equipment in the near future.

Applications are invited for the following posts:—

### INTERMEDIATE SYSTEMS DESIGNER

(APPLICATIONS) (REF. 78)

STARTING SALARY £7134 RISING TO £8781

The Authority is seeking an experienced Computer Systems Designer to work on a variety of projects.

Applicants should have a sound educational background together with 3 years or more practical design experience and a total of at least 5 years computing experience. Formal systems training would be preferred.

### BASIC SYSTEMS DESIGNER

(APPLICATIONS) (REF. 77)

STARTING SALARY £6312 RISING TO £7684

This post although covering the same type of applications would be at a lower level and the requirements are for similarly educated people as above with 2 years design experience and not less than 3 years practical computing experience. Formal systems training would be preferred.

### BASIC PROGRAMMER

(REF. 76)

STARTING SALARY £4834 RISING TO £6321

Applicants should have 1 year's practical experience in programming in COBOL, preferably also with plan and GEORGE 3 experience. Application forms and job descriptions are available from:

REGIONAL PERSONNEL OFFICER, YORKSHIRE REGIONAL HEALTH AUTHORITY, PARK PARADE, HARROGATE, NORTH YORKSHIRE.

Please quote appropriate reference number. Closing date for all posts 10TH DECEMBER, 1980.

(3582)

## Systems Development Manager

**with a Vital Commitment  
to Marketing**

This is an exceptional opportunity for an innovative systems professional with a sound grasp of business management, to contribute to the success of Sterling Health, a strongly marketing orientated organisation whose family medicine and hygiene products include a number of national brand leaders.

For this new position we're looking for a man or woman with the personality and in-depth knowledge necessary to up-date and improve a range of existing systems, as well as to plan and implement an extensive range of new systems necessary to meet the demands of a competitive business environment.

To a great extent this will be an advisory role, calling for an ability to interact and liaise effectively with senior management throughout the Division. The position will be based in Surbiton, Surrey, where we have access to the considerable computer facilities of the Sterling Winthrop Group. Current hardware comprises

a new IBM 4341 with 3880 Disc Controller and seven 3370s. Group systems development is already underway and by 1984, all systems, including ours, are expected to be on-line.

Applicants should be at least in their mid to late 20s with a working knowledge of COBOL, and three or more years' experience of systems development, preferably including the introduction of personal computing, using APL.

In addition to the kind of benefits you expect from a dynamic international group, we can offer a high negotiable salary and outstanding career prospects to the right person.

Please write or telephone Mr. J. Parry, Personnel Manager, Sterling Health, Winthrop House, Surbiton, Surrey. Tel. 01-399 5252.

**SterlingHealth**

A Division of the Sterling-Winthrop Group

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(3889)

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- \* Interactive working.
- \* Hewlett Packard HP3000.
- \* SPL.
- \* Image or other database knowledge.

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Please reply A.S.A.P. to:

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or 01-486 7242

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